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NAME OF AUTHOR/*NOM DE L'AUTEUR* LEONARD HENRY KING

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NAME OF SUPERVISOR/*NOM DU DIRECTEUR DE THÈSE* Dr. A MacKay

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THE UNIVERSITY OF ALBERTA

AN ATTRIBUTIONAL ANALYSIS OF STUDENT ACHIEVEMENT-RELATED BEHAVIOR AND THE EXPECTANCY EFFECT

by

© LEONARD HENRY KING

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled An Attributional Analysis of Student Achievement-Related Behavior and the Expectancy Effect submitted by Leonard Henry King in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Educational Administration.

Supervisor

Myer Horowitz

L. Stewin

Murray Smith

E. Miklos

Thomas L. Good
External Examiner

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ABSTRACT

This study focused upon the attributions of student achievement-related behavior as a function of the expectancy effect. The purposes of the study were to identify some characteristics of students' overt and covert behavior during the learning of mathematics, to gain some insight into the conceptions of self-performance which students appear to develop in classroom achievement situations and, from an attributional perspective, to discover some of the phenomena which characterize the teacher expectancy effect.

Ten consecutive mathematics lessons were videotaped in a Grade 6 classroom. These were used for follow-up stimulated recall interviews. Four target students reported their interactive thoughts and feelings pertaining to self-performance in mathematics. The teacher also reported her interactive thoughts. Transcripts of each student's and the teacher's reported thoughts and feelings were prepared. The videotape recordings of the lessons also facilitated later observation and analysis of teacher and student overt behavior.

Both student behavior data and teacher-student dyadic interaction process data were gathered. Through the development of category systems for analyzing student behavior data, student overt behavior and students' interactive thoughts and feelings were categorized, quantified, and described. Other student covert behavior data, including causal explanations of behavior, were analyzed by qualitative means. At an observable level, teacher-student dyadic interaction process data were coded using a low inference observation system, while teacher interactive thoughts pertaining to students and students' performances were submitted to a qualitative analysis.

For each of the four students a characterization of their conception of self-performance was interpreted from the student behavior data. The students were observed to be mainly on-task and reported self-oriented thoughts more frequently than subject matter oriented thoughts. Causal explanations of student behavior were discerned from identified clusters of chains of comments and from basic underlying ideas and beliefs. These indicated that a student's approach to learning seemed to be a function of the expectancy of success or failure, the perceptions of tasks, the affective state, the perceptions of self-performance in relation to others, and the perceptions of the teacher's impressions of him or her. Variations within these findings were recognized between the two "successful" students and the two "less successful" students.

The study established tentative relationships among and between the students' conceptions of self-performance, their causal perceptions of success and failure, their achievement-related behavior, the teacher's causal perceptions of the students' performances, the teacher's performance expectations of the students, and the teacher's behaviors toward the students. The widespread acceptance of effort attribution as the criterion of success or failure and the pervasiveness of the motivation of the report card seemed to act as underlying mechanisms for variations between the achievement-related behaviors of the successful students and the less successful students.

Implications for teaching arising from the findings were presented, along with some recommendations for further research.

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Chapter I

INTRODUCTION AND STATEMENT OF THE PROBLEM

Introduction

Research in teaching appears to be on the threshold of change. While the intention of this research has always been to investigate and identify the criteria of teaching effectiveness, the directions have ranged across such areas as teacher characteristics, teacher behavior correlates of student achievement and, currently, the mental life of teachers. But now the research seems to be characterized by a more profound change than one of focus of interest. Seeking to understand the mental life of teachers seems to have emerged at the same time as researchers have increasingly turned toward and embraced some of the conceptualizations and methodologies of research in related social behavior disciplines.

The motive for change in the research in teaching seems to have been provoked by a general call for more consequential findings than those derived from the research to date. When reviewing this research, writers such as Dunkin and Biddle (1974), Rosenshine (1976), and Bennett (1977) all commented on the inadequacy of conceptualizations of variables and on the diversity of methodological issues. Concerns such as these seemed relevant, given that much of the research until recently had been limited to one facet of social behavior--that which was observable.

The present research concern with teacher thought processes seems typical of a wider move by researchers and theorists such as Doyle (1978), Winne and Marx (1977), and Yinger (1978) to reconceptualize the research on teaching. As Winne and Marx (1977:676) state, "the considerably richer literature of research on human learning and information processing seem too germane to research on teaching to be ignored." From another perspective, the bidirectional nature of classroom influences (Fiedler, 1975; Winne & Marx, 1977) and the impact of student aptitudes on teacher effects (Brophy & Evertson, 1976b; Lockheed, 1975) introduce what would appear to be other relevant and significant variables. As a consequence, the very recent trend for research in teaching to incorporate the study of the mental life of students as well as of the teacher has prompted a renewed awareness by researchers of relevant variables normally associated with such disciplines as child development, learning psychology and social psychology.

Alongside this reconceptualization of research variables there seems to have been a growing willingness by researchers in teaching to adopt different research methodologies. With research in teaching being increasingly undertaken within the context of regular functioning classrooms, the phenomena under investigation often become the behavior and actions of people in their normal everyday lives. Not surprisingly, therefore, research designs, observational techniques, and data gathering processes which are usually employed in such social behavior disciplines as anthropology, social psychology, and sociology, are now being reconsidered and often used in recent research in teaching.

One domain of the research in teaching which reflects this pattern of change is that of the teacher expectation studies. In accord with many writers, Schmuck and Schmuck (1975:25) and Brophy and Evertson (1976b:48) point out that expectations characteristically are defined as predictions of how the self and others will behave. These expectations become translated into teacher expectancy effects when, as Dusek (1975:680) states, "functional relationships [exist] between teachers' own self-generated expectancies and students' academic achievement."

As definite trends in the findings from the teacher expectation studies have emerged, so the focus of interest in the research has changed. Reviews of research evidence by Brophy and Good (1974), H. Cooper (1978) and Dusek (1975) reveal that expectancy effects are reality in most classrooms. Furthermore, Brophy and Good (1974) indicate that the nature and extent of these expectancy effects in classrooms seem to depend on individual differences among teachers. Of recent significance, however, are studies that attempt to explain the dynamic processes that underlie the expectancy effects.

Recently, Braun (1976), Brophy and Good (1970), H. Cooper (1978), and Lockheed (1975), among others, have conceptualized models which hypothesize a relationship between process expectation effects, that is, the nature and extent to which the teacher varies his behavior when relating to or working with individual students, and product expectation effects, that is, the differential student academic achievements resulting from the teacher-held expectations.

Such models postulate the origins of teacher expectations, the interaction phase between the teacher and students, and the reactions of students to the expectations. Hence, the primary focus of many recent studies has been on the process expectation effects.

As researchers review their conceptualizations in the search for an explanation of the dynamic processes underlying the expectancy effect, certain patterns have evolved. The recognition of the significance of the cyclical two-way nature of classroom interactions has resulted in many expectation studies being focused on student learning variables as much as teacher behavior variables. Given that students tend to be striving constantly for self-esteem and self-respect, there seems every reason to believe that the interpersonal relationships in a classroom exert considerable influence on the academic performance of those involved. Consequently, expectation researchers have turned to the fields of educational psychology and social psychology for variables which will help in understanding some of these educational and interpersonal processes.

Attributional analyses of classroom social cognitions, that is, the thoughts and feelings of the teacher and students about self and interpersonal relationships in the classroom, is one such contemporary focus of interest in which the theory and research of social psychology is viewed as a resource for possible explanations of classroom interaction behavior. The educational implications of Weiner's (1974) attributional model of achievement motivation seem to provide a promising basis for exploring some of the behavioral mechanisms underlying the teacher expectancy effects. Seeking to understand the causal perceptions and behaviors of students and teachers in the social environment of the classroom is the primary goal of this study.

Need for the Study

This study was prompted by the need for a closer analysis of the processes by which a teacher's performance expectations of a student are formed and maintained, how they are "communicated" to the student and how they influence the student's behavior. Such an analysis of process expectation effects should reflect appropriately the intrapersonal, interpersonal, and environmental character of the typical classroom and thereby take adequate account of the bidirectional nature of classroom interactions. Only by an in-depth examination of the social cognitions of classroom participants can research hope to gain some fundamental insights into the underlying "mechanisms" of the expectancy effects.

From the individual student's perspective, a number of questions and issues seem pertinent to this analysis which, as yet, remain largely unanswered or unresolved. Does the student enter the learning situation with thoughts and feelings related to his expected performance? If so, what is the nature of these thoughts and feelings? To what can the student attribute their formation? Do they affect his performance in the learning situation? By what "mechanisms" do they affect performance? Also, because they derive from perceptions, these thoughts and feelings would likely be susceptible to some inappropriate or unrealistic interpretations and inferences. Beyond this analysis, a major concern of the student's thoughts and feelings is probably the extent to which they influence student behavior and interact with the teacher's behavior and expectations.

While many questions and issues surrounding the performance expectations the teacher forms and holds about students have been the focus of considerable inquiry, the recent momentum of changing trends in research into teacher expectations has raised a number of other concerns. Many of these pertain to the teacher's thoughts and feelings regarding the student's successes and failures. For example, in what way do a teacher's thoughts and feelings about a student's performance determine his behavior toward the student? How does a student's achievement-related behavior affect the teacher's thoughts and feelings about that student's performance?

In addition, the continuing concern with the extent to which teacher expectations are always appropriate is an issue still to be resolved. While there is every reason to believe that teachers hold performance expectations about their students which in some form may be unrealistic in their formation and maintenance, and/or detrimental/inhibitory to student growth, not a great deal is known about their respective consequences. Inappropriate expectations are commonly encountered human behaviors which, to some extent, are unavoidable. However, as Good and Brophy (1973) point out, teachers who become aware of some of these processes are likely to hold expectations and adopt behaviors which are more appropriate to successful student learning.

The kinds of questions and issues emanating from both the teacher's and the student's perspective involve interdependent processes. The expectation processes of a classroom need to be researched in the context of ongoing interactions. However, as a consequence of teacher expectations research concentrating on the teacher's domain of the expectancy effect, little is known about the dynamics and influences of the expectancy effect from the student's perspective. As Bar-Tal (1978b:23) suggests, "an attributional model of achievement behavior provides a useful analysis for understanding pupils' achievement behavior and teachers' behavior toward pupils." This study, which focused upon the overt and covert behavior of students and included some analysis of the overt and covert behavior of the teacher, therefore, should contribute information needed for expectation researchers to gain an overall understanding of the expectancy effect.

To date, few studies of an observational nature have been undertaken in the naturalistic setting of the regular classroom to investigate the nature of the expectation processes from an attributional perspective. There is a real need for a detailed study employing a cluster of observational techniques which will facilitate a description of the classroom and its social processes "the way it really is."

Purposes of the Study

This study was designed with four major purposes in mind. The first purpose of the study was to investigate some of the intrapersonal thoughts and feelings of students, especially those of an achievement-related nature, during and after a learning activity. More specifically, this aspect of the study examined individual students' thoughts and feelings about their performance, about the nature of the learning task itself, and about other persons involved in the learning situation. In the course of participating in learning situations a student develops his own ideas, views, and beliefs about self-performance which can be represented as his conception of self-performance. This conception of self-performance may be regarded as an evolving personal system of interrelated ideas, beliefs, views, emotions, and lines of reasoning concerning self-performance which direct and control his achievement-related behavior in the classroom.

Second, the study examined and described the interaction expectation process as it occurred in one classroom. By combining observations of the interactions between the teacher and individual students which occurred in the classroom with the information about individual students' thoughts and feelings, some insight should have been gained as to how the performance expectations held by both the teacher and the individual student were formed and maintained, how expectation effects were communicated, and how these may or may not have influenced student performance.

The third purpose of the study was to analyze the use of the introspective technique of stimulated recall with elementary school students. Studies reported by Clark and Yinger (1977), Conners (1978a), and MacKay and Marland (1978) have used stimulated recall in naturalistic settings with teachers, but only a few studies, such as that by C. Cooper (1978) and Nolan (1978), have employed stimulated recall methodology with elementary school students. Consequently, the effectiveness of this methodology as a technique for observing covert behavior of classroom participants can only benefit from continued evaluation.

This study varied from most other expectation researches because it included the combination of being classroom based, focused on the student, employed an attributional perspective, and used introspective procedures for observing covert behavior. Another purpose of the study was to present the findings and to consider their implications so as to facilitate their possible later examination and comparison with the evidence available from published studies. The explanations of, first, the communication of performance expectations and their influence on student behavior and, second, the processes of self-attribution of performance as they related to student achievement motivation may well be the richer for the evidence obtained in this study.

Research Problems

In this study four general questions were investigated.

1. What are the characteristics of students' behavior during a lesson?
2. What are the conceptions of self-performance that students appear to develop in classroom achievement situations?
3. From an attributional perspective, what phenomena characterize teacher expectancy effects?
4. How effective are stimulated recall procedures when used as a

research technique for observing the covert behavior of classroom participants?

Significance of the Study

Teacher expectations comprise an aspect of teaching behaviors worthy of study. Researchers view them as natural and unavoidable components of human functioning which, according to Good and Brophy (1973:80), can be converted to appropriate teaching behaviors. By holding expectations that are both realistic and flexible, teachers can prove to be more effective, which in turn should have a positive impact on the quality of learning.

At a more specific level, the dynamics and processes underlying the expectancy effects in natural classrooms are yet to be understood clearly. This study could contribute information which might add to such an understanding. An examination of the attribution behavior of students in achievement-related situations may well provide an explanation of the expectancy effects. Findings of this nature could have an impact on the kind of teacher behaviors most appropriate for maintaining positive student achievement motivation in the learning situation. Hence this study could have implications for improving the quality of instruction in classrooms and for associated teacher education programs, as well as contributing toward a developing theory of the expectancy effect.

Until now, nearly all teacher expectation research has been based on observable behaviors of student-teacher interaction. The implication has always been that covert behavior is a vital determinant of expectation-related behavior and certainly, in his study of teacher interactive thought processes, Marland (1977:185) found significant evidence to support this contention. By examining and analyzing both covert and overt interactive behavior of classroom participants, this study may have confirmed/disconfirmed the importance of what appears to be a more complete representation of classroom behavior.

This study was of an exploratory nature. The reported findings were not intended to be generalizable except in the heuristic sense that they might suggest what others may look for in future research. Students' achievement-related behavior as a function of the expectancy effect is merely one domain of inquiry emerging amidst the complexities of students' mental lives in classroom learning. As these complexities are researched, better theories of classroom learning and teaching should evolve.

Finally, the study continued a trend of research within the Centre for Research in Teaching at the University of Alberta which focuses upon the use of stimulated recall methodology as a research technique. Research by Conners (1978a), C. Cooper (1978), Marland (1977), and Nolan (1978) all involved the use of the stimulated recall technique in attempts to observe the cognitive thought processes of teachers or students. This study was the first to concentrate upon some social-psychological aspects of learning.

Definitions

In this study the following definitions of major terms were used:

Teacher Expectations: Inferences teachers make about the performance potential of children.

Student Self-Expectations: Inferences a student makes about his performance potential.

Teacher Expectancy Effects: Functional relationships between the teacher's own naturally formed expectancies and students' academic performance and achievement.

Attribution Processes: The processes by which a person explains the causes of events.

Self-Attributions: The explanations of causes for event outcomes in one's own behavior.

Self-Evaluation: An individual's ideas of his own abilities developed from comparing his performance outcomes with some performance standards.

Student Self-Performance: The performance on a task by the student as viewed by the self. Student covert behavior pertaining to self-performance is the thoughts and feelings of self in relation to performance on an achievement task.

Significant Other: A person whose evaluative opinions matter to the student, one whose performance evaluations are likely to be accepted by the student and used as a basis for forming his self-expectations.

Interpretations: Inferences that teachers make about the cognitive and affective conditions of learners during instruction. As Marland (1977:111) notes, "teachers made inferences, based on their perceptions of students, about--

1. what students were thinking;
2. what students' needs, motives, and desires were;
3. student motivational states; and
4. student feelings."

Interactive: The phase of teaching when the teacher is involved in instructional activity with students in the classroom.

Other major terms used during the study are defined in context.

Outline of the Study

This chapter has established the context and direction of the research. The study considered some attributions of achievement-related behavior of students as a function of the expectancy effect. The major purposes of the study, the research problems, and the significance of the study were presented along with the definitions of the major terms.

The initial section of Chapter II briefly focuses on some philosophical notions underlying the research approach which was adopted in this study. This is followed by a review of some of the related literature and research. A brief overview of research in teaching and an historical review of social interaction research, especially the classroom climate tradition, precedes an extended discussion of teacher expectations and their relationships to classroom interactions. Because of their significance to this study, some substantive aspects of attribution processes research are presented prior to a description of some attributional approaches related to classroom social behavior.

In Chapter III the research design is described. The subjects, the specific problems, the assumptions, the limitations, the data and data sources, the research methodology, and the phases in the study are presented.

In Chapter IV the methods for analyzing the data are described and the reliability information presented.

The four case studies have been selected so that the first pair of case studies, in Chapter V, describe the achievement-related behavior of successful students and the second pair of case studies, in Chapter VI, describe the achievement-related behavior of less successful students.

Chapter VII contains a summary and discussion of the students' achievement-related behaviors as a function of the expectancy effect as they relate to the research questions. Some implications and recommendations for further research are also presented in this final chapter.

Chapter II

REVIEW OF RELATED LITERATURE AND RESEARCH

Overview

The review of related literature and research which follows is designed to accomplish two main purposes. First, a philosophical, historical, and conceptual background to the investigation describes the base upon which the study is set, places the study in a time frame, and provides some underlying rationale for the research direction that has been adopted. The philosophical setting of the study section, the research in teaching section, and the classroom social interaction research section focus upon this purpose.

The second purpose of this review is to present the theory and research relevant to the study. The teacher expectation research section and the attributional analyses of achievement-related behavior section contain the theoretical approaches and research evidence which should facilitate the interpretation of the phenomena under investigation.

The Philosophical Setting of the Study

Underlying much of the "new" research on teaching (Winne & Marx, 1977) is a philosophy of science which serves to refocus educational research. Magoon (1977:654) cites Cronbach's proposal that "researchers [should] simply but radically reverse the priority

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they have traditionally placed on building generalizations about effects of variables and give careful attention to particular cases first." Harré and Secord (1972) also call for an explanation of social behavior by intensive study of individual cases. They state (1972:133) that "the generative mechanisms at work in social life" can only be discovered by accepting the notion that the processes which are productive of social behavior occur in individual people--"it is there that the vitally important dimensions of spontaneity and idiosyncracy occur." But this need for a consideration of individual cases is embedded in a deeper spectrum of research thought, notably the phenomenology tradition and the orientation referred to by Fay (1975) and Van Manen (1975), among others, as an interpretive science.

In Van Manen's (1975:6) terms, the interpretive orientation refers to all inquiry "which has as its main concern a systematic search for a 'deep understanding' of the ways in which man subjectively experiences . . . the social world." Fay (1975:79) views an interpretive social science as one which:

> . . . attempts to uncover the sense of a given action, practice or constitutive meaning: it does this by discovering the intentions and desires of particular actors, by uncovering the set of rules which give point to these sets of rules or practices, and by elucidating the basic conceptual scheme which orders experience in ways that the practices, actions, and experiences which the social scientist observes are made intelligible, by seeing how they fit into a whole structure which defines the nature and purpose of human life.

The constructivist notions for inquiry are elaborated further by Harré and Secord (1972). They advocate the use of collection and analysis of participants' accounts of social behavior. These thoughts, feelings, and social perceptions enable the discovery of the rules, plans, conventions, images and so on underlying the social behavior of individuals. Harré and Secord (1972:151) consider that "social behavior is the result of conscious self-monitoring of performance by the person himself . . . [and] the presentation of an appropriate social self is one of the important products of the self-monitoring of social performance."

These notions are based on a model of man in which people are treated for scientific purposes as if they were human beings as we know and understand them in everyday life.

> The Anthropomorphic model of man conceives of the subject of social investigation as a biological individual whose characteristically human actions are generated by the conscious self-monitoring of its performance in accordance with certain sets of rules which it represents to itself in the course of making anticipatory and monitoring commentaries upon its performance, and which it subjects to critical appraisal in retrospective commentaries. (Harré & Secord, 1972:93.)

Wilson (1977), in a discussion of the uses of ethnographic techniques in educational research, points out that the phenomenological tradition requires that the researcher learn the meaning structures that determine each individual's behavior. This is achieved by the researcher experiencing and interpreting the behavior partly from the perspective of the participant and partly from the perspective of an external observer. As Wilson (1977:250) states, "the researcher must develop a dynamic tension between the subjective role of participant and the role of observer so that he is neither one entirely."

These approaches to scientific inquiry underlie grounded theory as advocated by Glaser and Strauss (1967). From using a strategy for handling descriptive and interpretive data in research, theoretical conceptualizations are generated. Yinger (1978) considers such a method of theory construction to be very appropriate to the theory development and research in teaching. Ethnographic studies, such as those undertaken by Bremme (1976), Doyle (1977), Jackson (1968), and Smith and Geoffrey (1968), provide support to the usefulness and effectiveness of conducting this type of extensive descriptive and interpretive line of scientific inquiry. Many other descriptive type researches in teaching, while not ethnographic in character, nonetheless incorporate significant elements of the constructivist or interpretive approach to science.

Given the intention and direction of this study, a constructivist or interpretive approach to research, as described generally by Fay (1975), Magoon (1977), and Van Manen (1975), and specifically by Harré and Secord (1972), seemed the more appropriate to adopt. The context for the phenomena of social behavior under examination was a normal classroom. By describing and seeking to interpret and analyze individuals' covert and overt social behavior, hopefully the "generative mechanisms" in classroom social life which pertain to expectancy effects might be discovered.

Research in Teaching--An Overview

After several decades, research in teaching is still in a state of evolution. While conceptualizations of research variables have continued to be modified and/or refined, and a variety of methodologies have been tried, few definite and pertinent findings have emerged. Yet research in the area continues to proliferate. Most of the major research efforts in the field have occurred since 1960 and it is possible to discern a number of changes in the pattern of studies up to the present time. Research in teaching, therefore, is in a dynamic state.

Recently, Rosenshine and Furst (1973) and Dunkin and Biddle (1974) have contributed to organizing the direction of research in teaching. Rosenshine and Furst's descriptive-correlational-experimental loop suggests that research into a domain of teaching should proceed from a descriptive, exploratory phase of identifying variables, to a correlational phase of establishing significant relationships between and among the variables, to an experimental phase in which hopefully cause and effect relationships between and among the variables might be found. Dunkin and Biddle's contribution was to propose a paradigm for research into classroom life. By grouping the relevant variables under four larger classes, notably presage, context, process, and product variables, Dunkin and Biddle have provided a model and accompanying rationale which has served as a theoretical framework for a number of researches into teaching.

General reviews of research on teacher effectiveness by Dunkin and Biddle (1974), Gage (1963), Rosenshine (1971), and Travers (1973), and smaller scale reviews such as those by Bennett (1978), Fedigan (1978), King and Smyth (1978), and Rosenshine (1977), all indicate that some conclusions of a seemingly consistent nature have emerged amidst a maze of tentative, inconclusive, and often pessimistic findings. As Brophy and Evertson (1977:79) comment, "the number of teaching behaviors established as correlates of teaching effectiveness is still limited to a handful." Many of these findings may not be generalizable to all teaching and learning situations, for often they are derived from descriptive and correlational studies involving a particular subject area, with students at a certain grade level who possess certain characteristics. Furthermore, the findings tend to pertain only to those teacher behaviors which are observable. Hence, failure to take account of Gage's (1963:132) comment that "the programs that teachers carry around in their heads need analysis" may explain the relative lack of return on the investment of research effort to date.

Not surprisingly, some redirection of research effort has now evolved. The National Institute of Education's Panel 6 Report (1975) expressed a commitment in future research to studies which seek to understand the mental life of teachers. As the report states, "What teachers do is directed in no small measure by what they think. Moreover, it will be necessary for any innovations in the context, practices, and technology of teaching to be mediated through the minds and motives of teachers" (1975:1). The report is adamant that the relationship between teacher thought and action cannot be overlooked. Clark and Yinger (1977), Conners (1978a), Marland (1978) and Marliave (1976) all report research which studied this covert mental behavior of teachers.

Winne and Marx (1977) also describe a reconceptualization of the research in teaching. Foremost in their discussion is an extension of the research effort to embrace the unobserved and previously undescribed internal events in the teaching-learning environment. "Specifically, we see the mental life of both teachers and students in classrooms as critical items to be studied if we are to understand the process by which teaching influences students' learning" (Winne & Marx, 1977:670). Few studies in the research in teaching have concentrated upon the covert behavior of students. Doyle (1978:31) recently emphasized that "the study of teaching involves considerably more than the study of teachers."

While suggesting there is a demand for a greater research concern with student processes in classrooms, Doyle (1978) nevertheless sees several problems to be encountered when attempting to conceptualize student covert behavior in teaching effectiveness:

1. Little information is available regarding student processes in the classroom because previous research has focused largely on teacher variables.
2. Only gross indicators of student mediating processes, such as time-on-task, and aptitude variables are known about students.
3. Most of the existing research on student mediating processes is laboratory oriented.

The need for comprehensive descriptive studies of student covert behavior in the naturalistic setting of regular classrooms seems considerable in order to explore the relevant variables as well as the relationships between and among them.

Some studies have attended to this concern. Erlwanger's (1974) study into the covert behavior of elementary level students as they learn mathematics, and Nolan's (1978) investigation of student thought processes while involved in story writing are two researches which have attempted to conceptualize student mediating processes in teaching effectiveness. Only a few studies, such as that by Weinstein and Middlestadt (1978), have investigated student covert behavior related to social interaction and various affective aspects of learning. The research to be reported in this study, similar to that of Weinstein and Middlestadt's, is intended to contribute further to the evolution of variables in student social cognitions as they pertain to teacher effectiveness.

Classroom Social Interaction Research--The Classroom Climate Tradition

The Early Studies

While research in teacher expectations seems to stem mainly from Rosenthal and Jacobson's (1968) study, as reported in Pygmalion in the Classroom, interest in social-psychological variables relative to teaching effectiveness in general, and to some antecedents of teacher expectations in particular, can be traced back to the 1920's. Appropriate substantive issues for investigation gradually emerged as researchers refined continually their conceptualizations of variables. Likewise, methodological issues gradually clarified as research designs and data gathering techniques were developed appropriate to the phenomena under study. This line of research is popularly referred to as the classroom climate tradition.

According to Withall and Lewis' (1963) historical perspective, the earliest studies in social interaction as related to teaching effectiveness focused on identifying the teacher traits, qualities, and behaviors thought to facilitate learning. In a sense, the studies by Morrison, Naninga, Wickman, Barr, and others, cited by Withall and Lewis, have continued but, as Ryans (1960) found, few consistent findings have emerged. In Dunkin and Biddle's terms (1974:36-48), such a result in the research effort was hardly surprising. Trying to establish a relationship between presage and product variables without considering the very important set of process variables, often referred to as "the black-box," was basically unrealistic.

A technique of data gathering that had a definite impact on early classroom social interaction research was Moreno's (1934) sociometric device for measuring the relationships within groups. The technique inspired a line of research which, for the first time, attempted to assess the interpersonal relationships among students by gathering data about social relationships in the classroom from the students themselves.

About the mid-thirties, teachers' behaviors in the classroom became the focus of analysis and the classroom climate tradition was established. This represented the first real attempt to research Dunkin and Biddle's (1974:44) process variables. The major studies of this kind were the landmark works of H. H. Anderson and his colleagues which culminated in a series of Applied Psychology Monographs (1946). They studied the effects on student classroom performance of teaching behaviors classified as "dominative" versus teaching behaviors classified as "integrative." These categories of teaching behaviors reflected opposing ends of some continuum in teachers' use of language and use of control techniques. The Anderson studies seem to demonstrate that a teacher's classroom personality and behaviors influence the behavior of the students taught in that class.

Meanwhile, the Iowa studies of Lewin, Lippitt, and White (1939) resulted in a broadening of the social interaction research perspective. They investigated the interpersonal interactions of children in differing social climates by observing the impact of autocratic, democratic, and laissez-faire leadership styles on group morale, group participation, and group productivity. When applied to the classroom setting, the Iowa studies seem to foster an examination of the entire complex of relationships in learning groups.

The matter of the affective states of learners possibly mediating their overall performances and achievements became a substantive issue of prominent concern. Group dynamics opened the way for research in classroom social interaction to consider what Withall and Lewis (1963) refer to as the "psyche" group and the "socio" group of any classroom group. This basis for organizing group social interaction data, notably the accommodation of personal needs and institutional or task needs through group processes, has persisted in social interaction research (Getzels and Thelen, 1960).

Withall's (1949) attempt to measure the social-emotional climate of classrooms was part of a major attempt at the University of Chicago to develop a general theory of instruction based on affective as well as cognitive aspects. He saw the social-emotional climate as a group phenomenon determined mainly by the teacher's verbal behavior as representative of his total behavior. Withall's well known Climate

Index represents the ratio of learner-centered statements to teacher-centered statements. One of many early users of the Climate Index was Flanders (1949) who found teacher-centered climates to be associated with more negative achievement-related student behaviors, and learner-centered climates to be associated with more positive achievement-related behaviors.

Another trend in the Chicago studies, as reported by Withall and Lewis (1963:699), was to examine:

> . . . the dynamics of social interaction at the overt level of teachers' and learners' observable behaviors and at the same time trying to relate these behaviors as observed and interpreted by the "actors" themselves to the inferred covert dynamics.

In essence, this trend of research appears to be a generalized antecedent of the study reported in this dissertation and represents a significant broadening of investigation into Dunkin and Biddle's (1974) process variables. Singletary's study, cited by Withall and Lewis (1963:700), which sought to investigate teachers' and administrators' perceptions of students and of each other, seems to be one of the earliest to refer to the concept of expectations in classroom research.

By the early 1950's researchers were only coming to realize the complexities involved with classroom processes in the learning situation. They seemed to recognize that research would have to focus on the teacher's actual behaviors in the classroom and his understanding of the student's self and social perceptions, on the student's perceptions of the instructional activities, and on the group life context in which the teacher and student interact. Yet researchers were without adequate instrumentation and conceptualization of these process variables to handle the direction of research. The subsequent widespread concern with the implications of findings in social psychology for classroom groups reflected more than just an awareness in the importance of the social context of learning. Possible means for dealing with the complexities of the classroom were also being considered by investigators. The character of the classroom climate tradition of research was still evolving.

The Studies of the 1950's and 1960's

Among the numerous studies in the field of classroom social interaction undertaken in the 1950's and 1960's are some which pertain directly to substantive issues related to the later expectation research. Jenkins' (1951) study typified a line of research which established the interdependent nature of the student-teacher relationship. Other studies by Gage and Suci, Jenkins and Lippitt, and Bush, all cited by Withall and Lewis (1963:703), and by Hallworth (1962) investigated the nature of interpersonal perceptions held by teachers and students, but they yielded mixed results. Withall and Lewis (1963), in reference to other studies again which developed further the use of sociometry, noted that students' relationships with each other seemed to be determined by teacher behavior factors. However, the many studies of the differential effects on teaching/learning of opposing styles of teacher behavior seem to have the most significance for the later expectation research.

Ever since 1950, classroom social interaction research into styles of teacher behavior and their effects on student performance seems to have been characterized by conceptual confusion, inappropriate methodology and unsophisticated design. The continuum along which teacher behavior is hypothesized to vary has remained substantially the same, yet new terminology, modified definitions, and refined instruments keep appearing. Attempting to establish relationships between Dunkin and Biddle's (1974) process and product variables was fraught with problems.

Withall's (1949) seven categories of styles of behavior along the teacher-centered – learner-centered continuum probably formed the basis of Flanders' (1967) reconceptualized teacher behavior continuum of direct influence – indirect influence and its nine categories. The upsurge of classroom based observational studies, using Flanders' Interaction Analysis Categories system, modifications of it, or some other observational instrument, has yielded a maze of evidence. Dunkin and Biddle (1974) reviewed the evidence from the perspective of two not necessarily related concepts--indirectness and warmth. Given the conceptual confusion of these notions and the problems of their valid and reliable measurement, it is not surprising that Dunkin and Biddle (1974:132) were only able to conclude that some relationships between the two concepts and student growth were tentatively established, even though such relationships were based on weak evidence. Twenty years of vigorous research effort seemed to constitute a necessary growing phase in the classroom climate tradition.

The Current State of Classroom Interaction Research

In the 1970's a great deal of classroom social interaction research has focused upon the quality and quantity of actual specific interpersonal interactions. Several studies showing a relationship between specific teaching behaviors and student achievement have emerged from the findings. The more fruitful results in the search for process-product relationships probably reflect the greater use of descriptive and correlational classroom based studies, more sophisticated instruments, and the more refined, better defined research variables. Rosenthal's (1974) typology of teacher interaction behaviors--classroom climate, teacher input, teacher output, feedback--forms a useful basis for reviewing this research, even though the typology was originally designed to categorize teacher expectancy effects. References to socio-economic status (SES) of students will appear frequently. Many of the research findings are qualified according to this dimension of student individual differences. There is a definite tendency in the research on teaching for SES level to be used as a proxy measure for other dimensions of student individual differences such as ability, knowledge, motivation, and performance expectations.

Research suggests that teachers who create a warmer socio-emotional climate will be generally more effective. Marliave (1976:25) reports that "a family-like atmosphere is one of the most crucial instructional variables for enhanced student learning." Joyce (1975) found the variables of classroom cohesiveness and affirmativeness to be important elements of a positive classroom climate which is most conducive for learning. Good and Grouws (1977:123) also found that more effective teachers were those who established successfully a more relaxed atmosphere by employing a number of interaction teaching behaviors known to be associated with gains in student learning. Brophy and Evertson (1977) and Rosenshine (1977) concluded that expressions of teacher affect were associated with the achievement of low SES students, but not associated with the achievement of high SES students.

Verbal input, as a factor of classroom climate, pertains to the amount and kind of presentation of new and difficult material to students. Research as reviewed by Bennett (1978), Brophy and Good (1974) and Rosenshine (1977), suggests that the more effective teachers are those who monitor appropriately the verbal input in accordance with levels of student achievement and motivation. Such a finding has major implications for teacher expectations, as observed by H. Cooper (1978) and Brophy and Evertson (1976b).

Verbal output refers to those teacher interaction behaviors which provide appropriate action opportunities for students to respond and ask questions. Frequency of occurrence and staying with students are considered by researchers to be two dimensions of verbal output. Staying with a low SES student seems to be important for a different reason than staying with a high SES student. As a general rule, Brophy and Evertson (1977:87) found that, when asking factual questions of lower elementary students, the more effective teachers tended to give the answers if no response had followed. They would only stay with low SES students in this situation if concerned about the personal participation of the student. Brophy and Good (1974) and studies cited by H. Cooper (1978) found that staying with high SES and also upper elementary students was an effective teacher behavior when the student failed to respond to a thought process type question.

High SES students seem to create more output opportunities for themselves and these were more accepted by the effective teacher. Evidence reported by Good and Grouws (1977:125), Brophy and Evertson (1977:87), and Brophy and Good (1974) contributed to this overall finding. Meanwhile, in terms of teacher initiated contacts, research has found considerable diversity in their effectiveness.

Teacher feedback appears to be related closely to student achievement. According to Bennett's (1978:25) review of the recent research, feedback in the form of praise, to have any effect on achievement, should be contingent on performance, should reflect genuineness on the part of the teacher, and should be employed with regard to individual differences. Stallings and Kaskowitz (1974), Soar (1973), and Brophy and Evertson (1974) all found teacher praise to be positively related to the academic achievement of low SES students with higher correlations being recorded for teacher praise of academic responses in comparison with global praise of student behavior. Brophy and Evertson (1974) found for low SES students that teacher criticism of incorrect student responses was negatively related to academic achievement. Conversely, Brophy and Evertson observed that for high SES students teacher verbal praise failed to correlate with student achievement, but teacher criticism of poor work was positively related to achievement gains.

Academic and behavioral feedback has also been linked with student achievement. Good and Grouws (1977:123) state that highly effective teachers are good providers of process feedback. Brophy and Evertson (1976a) and Soar (1973) both found for low SES, lower elementary grade students, immediate corrective feedback was important for student achievement. In reviewing a number of studies, Marliave (1976:22) concluded that "the provision of feedback and explanation according to student need was important for higher learning outcomes."

Classroom interaction involves numerous kinds of interpersonal transactions and relationships. The research in teaching has indicated that teacher interaction behaviors are closely associated with student learning. However, as revealed by the sample of studies reviewed above, the nature of the relationship is a very complex one depending on such crucial variables as subject matter, the teaching strategies being employed and, most important, the individual attributes of the persons involved. Nevertheless, the classroom climate tradition of research appears to have "come-of-age."

Throughout this review of recent classroom interaction research, many of the conclusions drawn will need to be qualified in terms of student individual variables and their associated effects on the performance expectations held by teachers. Furthermore, the conclusions have been derived from studies of observable aspects of behavior and do not reflect the growing research concern in investigating teacher and student covert behavior. The relationships between process and product variables presented in the review, therefore, should be viewed as tentative and accepted with caution.

Summary

In this section of the review, an historical overview of the research literature on social interaction was presented as background to the current research effort into teacher expectancy effects. Whereas studies on teacher expectancy effects have occurred largely in the last 10 years, many of the conceptual areas and issues relevant to the research evolved amidst the global studies of the classroom climate tradition. The importance of affective aspects of behavior in learning, the character of interpersonal perceptions, the influence of teacher behaviors on students' perceptions of each other, and the impact of teacher-student interactions on student achievement are all probably significant components of the expectancy effect.

Teacher Expectation Research

Teacher expectation research has a comparatively short history. In just 10 years a proliferation of studies, some experimental and others descriptive, some laboratory based and others classroom based, have brought into some perspective the pervasive effects of teacher expectations on classroom interaction behaviors and student achievement. This review of teacher expectation research consists of a brief overview of the early studies and a more comprehensive review of current emerging patterns in expectation studies, especially those pertaining to process expectation effects.

An Historical Overview

Nearly all the literature on teacher expectation studies points to Rosenthal and Jacobson's (1968) Pygmalion in the Classroom as the seminal study from which much of the later researches are derived. Yet the notion of self-fulfilling prophecy, which was the primary phenomenon under investigation in that study, was well established in the social psychology literature before 1968. Robert Merton (1949:179), who is often credited as having introduced the self-fulfilling prophecy, makes reference to an early sociologist, W. I. Thomas, who in turn observed, "If men define situations as real, they are real in their consequences." Merton pointed out that predictions or prophecies of a situation can become an integral part of the situation and so affect subsequent developments.

Rosenthal and Jacobson (1968) were probably the first researchers to attempt to show how the self-fulfilling prophecy might work in the classroom. They hypothesized that teachers devoted approximately equal time to students regardless of expectation, but that expectation affected the quality of teacher-student interaction. By providing teachers with false information about the intellectual capabilities of some of the students, the experimenters found they were able to manipulate teachers' expectations such that significant changes in student intellectual performance subsequently accrued.

Several reviewers of the Rosenthal and Jacobson study, such as Elashoff and Snow (1971), Jensen (1969), and Thorndike (1968), have criticized the experimental design and statistical procedures of the study for not being sufficiently rigorous to justify the generalizations about teacher expectancy that were made. However, this criticism had little effect on investigators' attempts to continue or replicate the research. Studies which attempted to replicate Rosenthal and Jacobson's findings have occurred both in the classroom and the laboratory. Some of the early studies which have provided evidence to support the expectancy hypothesis are reported by Anderson and Rosenthal (1968), Brophy and Good (1970), Conn, Edwards, Rosenthal, and Crowne (1969), Meichenbaum, Bowers, and Ross (1969), Rothbart, Dalfen, and Barrett (1971), and Rubovits and Maehre (1971). Nevertheless, a number of studies, such as those by Claiborn (1969), Fleming and Antonnen (1971), and José and Cody (1971), report no supporting evidence.

Once research had established tentatively the existence of the expectancy effect, investigators began to examine the variations in teacher behavior that might communicate such expectations. This change emphasized less concern for product expectation effects and a channelling of the research effort mainly into the study of process expectation effects. As Haigh (1974:98) points out, this change seemed necessary if investigators were "to determine the success of their attempts to modify expectations, or understand the means by which teacher expectations produce change in pupil behavior." Some of the early evidence on the character of verbal interaction in the classroom, as reported by Hudgins and Ahlbrand (1970) and by Jackson and Lahaderne (1967), indicated unequal distribution of teacher-student interactions. However, many of the early studies have shown that teacher expectancy may be a major underlying cause of variations in interaction. The experimentally induced expectations studies of Kester and Letchworth (1972), Meichenbaum, Bowers, and Ross (1969), Rothbart, Dalfen, and Barrett (1971), and Rubovits and Maehre (1971), and those studies which investigated existing, unmodified teacher expectations, such as Brophy and Good (1970) and Haigh (1974), all found definite evidence to the effect that teacher expectations influenced the quantity and quality of teacher behavior when interacting with students.

The early research on teacher expectations raised many issues for further research and, predictably, these have provided the foci for much of the research in the last five years. The pros and cons of investigating manipulated or induced expectancy effects as against naturally occurring or non-manipulated expectancy effects, how performance expectations might be communicated in the classroom, and how these communications influence student performance seem to form the bases of the continued research effort into teacher expectations.

The Emerging Patterns in Expectation Studies

From the review of current expectation research, several major trends seem to have emerged in recent years. Some of these provide important background to this research.

One trend of research that has gained greater credence recently has been the recognition by research that expectation formation and communication involves a two-way process. As Brophy and Evertson (1976b), Fiedler (1975), and Winne and Marx (1977) all report, research on classroom interaction generally, and expectancy effects specifically, has in the past tended to focus conceptually and methodologically on adult/teacher as being active and causal and the child/student as being reactive and passive. But now, as Brophy and Evertson (1976b:9) point out, there are significant individual differences among students in the opportunities and problems which they present to the teacher. H. Cooper (1978), Dusek (1975), and Lockheed (1975) recognized the significance and function of student characteristics as contributing to the expectancy effect. Braun (1976) states that student self-expectations constitute the key to this behavioral cycle. The bidirectional nature of the expectancy effect seems to be well summed up by H. Cooper's (1978:8) comment that, "a cyclical process of mutual influence seems most supportable by the literature." The two-way process emphasizes the interactive aspect of expectations, with students' behaviors and self-expectations being viewed as major influences on the development and maintenance of the expectation effect.

A second trend to emerge from the research is the recognition of the complexity of teacher and student individual differences. Muttart (1977:4) cites a number of studies which demonstrate that only some teachers treat students differently on the basis of expectations. As well, Brophy and Good (1974) have recognized for some time that teachers vary in their susceptibility to the expectation effect, namely, proactive, reactive, and over-reactive teachers.

> Proactive teachers appear to be undeterred by their expectations for low achieving students, so that they spend more time interacting with lows than highs. Reactive teachers simply allow existing differences between high and low students to unfold, so that highs, due to their own initiative and ability,

> come to dominate public classroom life. . . . A third class of teachers overreacts to student differences (in supplying qualitatively and quantitatively superior treatment to highs), thus exacerbating differences between students. (Brophy and Good, 1974:303.)

Likewise, Braun (1976:195) discusses what he calls "teachers' differential susceptibility to input factors," and concludes that teacher information and personality are the prime factors underlying the respective positions.

Only very recently have individual differences in students come into the limelight with expectation research. Therefore, the following studies are significant as they report information about student attributes or characteristics which are associated with contrasting teacher expectations, attitudes, and beliefs.

Dusek and O'Connell (1973), Lockheed (1975), and Willis and Brophy (1974) all found student achievement to correlate highly with teacher expectations. Adams and La Voie (1974) and Brophy and Evertson (1976b) found considerable sex differences especially in the elementary grades. According to the latter study, teachers hold much more positive views of their female students, and these were transferred into their behaviors more during private contacts than during public sessions. The studies by Cooper, Baron, and Lowe (1975), Finn (1972), Lockheed (1975), Long and Henderson (1974), Rosenthal, Baratz and Hall (1974) and Rubovits and Maehr (1973) all report generally no race effect on teacher expectations. Other studies that investigated the effects of physical attractiveness and social class seem to provide no consistent pattern.

Another trend that has emerged over a longer time period has been the move toward naturalistic studies, both in terms of the setting for research and the kind of expectation effects to be observed, that is, the non-manipulated as against manipulated effects. Rosenthal (1976) notes that non-laboratory studies of this kind have risen from 10 percent prior to 1970 to 41 percent between 1971 and 1975. Brophy and Evertson (1976b) justify the move away from the laboratory on the grounds that more accurate and more generalizable findings can be derived from natural classroom research. Braun (1976), H. Cooper (1978), and Lockheed (1975) state that the move is justified because much of the supportive evidence for the expectancy effect comes from non-manipulative studies such as those by Brophy and Good (1970), Crano and Mellon (1978), Dusek and O'Connell (1973), Good and Brophy (1972), Jeter and Davis (as reported in Jeter, 1975), McDonald and Elias (1976), and O'Connell, Dusek, and Wheeler (1974).

A fourth recent trend in the expectancy effect research is the concern with developing an understanding of how teacher performance expectations of students are translated into particular student behaviors and achievement. Braun (1976), Brophy and Good (1970), H. Cooper (1978), and Lockheed (1975) all propose models which endeavor to explain the process expectation effects and which are still mainly being researched.

Brophy and Good (1970:365-366) posited a model conceptualizing the processes underlying the self-fulfilling hypothesis:

> (a) The teacher forms differential expectations for pupil performance; (b) He then begins to treat children differently in accordance with his differential expectations; (c) The children respond differently to the teacher because they are being treated differently by him; (d) In responding to the

> teacher, each child tends to exhibit behavior which complements and reinforces the teacher's particular expectations for him; (e) As a result, the general academic performance for some children will be enhanced while that of others will be depressed, with changes being in the direction of teacher expectations; (f) These effects will show up in achievement tests given at the end of the year, providing support for the "self-fulfilling prophecy" notion.

Lockheed's model of the expectation process reflects an influence of expectation states theory (Berger, Conner, and Fisek, 1974). A crucial aspect of the model is the use of the teacher as a source of a student's self-evaluation, which in turn determines a student's self-expectations. Lockheed's (1975:8) model of the expectation process focuses upon:

> . . . the student characteristics of achievement, status, and behavior and personality as determining teacher expectations and teacher behaviors, that teacher expectations determine student academic achievement and teacher behaviors, that student characteristics are correlated with academic achievement, and that teacher behaviors affect student academic achievement.

Furthermore, student self-evaluations are determined by status characteristics, evaluations of others, and achievements. This model implies that student individual differences are crucial to the explanation of expectation effects.

Braun (1976:192-208) proposed a model of the process of expectation effects which attempts to explain in more social psychological terms the behavioral cycle between teacher input and learner output. He traces the process through a number of stages in the cycle: sources of teacher expectancy--input factors, differential susceptibility to input factors, transmission of expectancy cues--teacher output, learning response to output cues, learner self-expectations--pupil output. Braun cites a great deal of evidence in support of each stage. The interesting features of this model include the role of student self-expectations--similar to Lockheed--and the cyclical nature of the process.

H. Cooper's (1978) model for expectation communication and behavior influence focuses on an attributional explanation. The causal sequence of teacher cognition, teacher behavior, student cognition, and student behavior is set within the interaction context of a classroom. Again, evidence is cited to support some of the features of the model. Cooper's model is presented in a later section of this review of literature.

Each of the models tend to trace the "communication" of expectations from the time teachers form them, to the way teachers' behavior toward individual students varies according to these expectations, to the differential way in which the individual students behave and react accordingly and, finally, to how students' performance and achievement are affected. The supporting research underlying these models indicates clearly that the relationship between teacher behaviors and student achievement is far from being a simple one; that as a consequence no definite cause and effect mechanisms have yet been established and, as already indicated, the direction of influence regarding performance expectations is probably of a two-way kind between the teacher and the student concerned.

These four trends generate a fifth. Research in teaching seems to be increasingly taking account of the uniqueness of any one classroom group. As Brophy and Evertson (1976b:10) state, "Students in one classroom may only have chronological age and presence in the classroom in common." How the individual members of any one classroom group think and behave, react and interact, are phenomena unique to that group. Consequently, research has moved toward a phenomenological perspective. The study of attributional processes has evolved from this kind of reality--trying to make sense out of the everyday experiences of human behavior. Because attribution processes are related to expectations, it seems logical that an attributional perspective might be used to view the classroom in "the way it really is."

Classroom Interactions and the Expectancy Effect

The early studies in teacher expectation research established the need to examine classroom interactions as the possible means by which teacher performance expectations of students are communicated in the classroom. A great deal of process expectation research has now been undertaken investigating the differential treatment of students based on different performance expectations. The quantity and especially the quality of interactions seem to serve as the medium of communicating the expectations. In the review that follows, Rosenthal's (1974) typology of teacher behaviors, namely, climate, input, output, and feedback, provides a useful basis for organizing the evidence which has accumulated from the recent research.

Climate. There is no paucity of evidence to support the fact that a teacher's high expectations for a student's performance gives rise to a climate of warmth, attention, and emotional support. Teachers appear to spend more time and interact verbally in more positive and supportive ways with high expectation students than with low expectation students. In addition, as reported by Lockheed (1975:4), teacher expectations may be communicated by such indirect teacher behaviors as general seating arrangements, use of ability groups, and use of superior ability students to assist less able students. H. Cooper (1978:9) cites researches by Chailkin, Sigler, and Derlega, Kester and Letchworth, and Page which found that many non-verbal teacher behaviors associated with positive emotional attraction were displayed by teachers most frequently in interactions with higher achieving students.

Input. Research evidence suggests that teachers vary the amount and kind of verbal input they use with different students. The level of activities teachers select to correspond with their expectations is a critical example of verbal input. H. Cooper (1978:10) cites research by Cornbleth, Davis and Button, Jeter and Davis, and Mendoza, Brophy and Good, which indicates that slow students have less difficult material taught to them. Doyle, Hancock, and Kifer (1971) report findings that teachers monitor the learning opportunities for a group according to their perception of that group's potential. Brophy and Good (1974) report that teachers generally not only expect and demand less of low expectation students, but that less difficult material is given to those students. Research by Beez (1970), Carter (1969), and Pidgeon (1970) indicates that slower learners receive fewer opportunities to learn new material than students perceived as bright. The evidence suggests one reason, therefore, why the quantity and quality of interactions between the teacher and low expectation students are likely to be quite different from those between the teacher and high expectation students.

Output. Evidence is also available which indicates that teacher verbal output behaviors contribute to differences in the quantity and quality of interactions with students for whom differential expectations are held. Brophy and Good (1974) report that, overall, low achieving students generally receive fewer teacher contacts than high achieving students. In terms of staying with students, Good and Brophy (1973), Rosenthal (1973), and Rowe (1974) found that teachers' encouragement for the output of student responses was much greater with high achieving students. Teachers would wait longer for answers, would prompt and probe more by rephrasing and giving helpful hints, and would ask harder questions of bright students. Likewise, as Rothbart, Dalfren, and Barrett (1971) and Cornbleth, Davis, and Button (1974) found, teachers interacted verbally in more positive ways with high achieving students by accepting and using their ideas more and, overall, spending more interaction time with them than with low achieving students.

Not surprisingly, high ability students are likely to initiate more academic teacher-student interactions than low ability students. This finding was reported by Brophy and Good (1974) after reviewing a number of studies. However, this may well be a function of other teacher interaction behaviors such as the use of feedback. In an experiment, H. Cooper (1977:426) found that when teachers were asked to stop criticising lower ability students the number of student-initiated interactions increased to a significant level. Entwisle and

Webster (1972), in another study, found that when teachers increased the amount of praise the frequency of student hand raising also increased.

Research into teacher-initiated contacts has revealed no consistent pattern. H. Cooper (1978:12) suggests that "the teacher-contact-initiative may be a function of teaching strategy differences" and cites a number of studies, such as Firestone and Brody's (1975), to support this view.

Feedback. Teacher feedback behaviors have been the subject of considerable expectation research inquiry. Most studies, especially those which are classroom based, provide evidence which indicates quality of interaction differences exist between the teacher and students for whom differential performance expectations are held. Teacher feedback comprises two components--an evaluative component, usually in the form of praise or criticism, and an academic corrective or explanatory component.

Expectation research has revealed that differential use of praise and criticism is particularly sensitive in communicating teacher performance expectations to students. Beez (1970), Brophy and Good (1974), Cooper and Baron (1977), Dalton (1969), Firestone and Brody (1975), Meichenbaum, Bowers, and Ross (1969), and Rubovits and Maehr (1971) all report evidence that bright students tend to receive more praise than their lower achieving counterparts. Also, lower achieving students were reported to receive more criticism, especially in failure situations. Smith and Luginbuhl (1976:270) concluded that "there existed a tendency to accord the student of greater ability more evaluative communications (encouragement and criticism)." As an explanation, they suggest that low expectation students may receive less evaluative feedback because teachers feared that it would contribute to a negative label effect.

Teacher reinforcement behaviors found by Brophy and Good (1974), which are thought may transmit the differential effects, include rewarding inappropriate behavior of low expectation students, criticizing low expectation students more than high expectation students in parallel situations, failing to praise low expectation students in situations where other students are typically praised, and failing to give low expectation students feedback concerning correctness. A study by Willis (1970), which indicated that teachers tended to ignore comments from lower achieving students more than from higher achieving students, and a study by Gay (1975), which showed that more positive teacher feedback was given to higher achieving student responses, provide evidence which is consistent with teacher feedback behaviors and the expectancy effect.

While the accumulated evidence indicates clearly that teacher feedback behaviors contribute significantly to a differential quality of interaction between the teacher and different students, Dunkin and Biddle (1974:130) alert researchers to the need for some caution when interpreting the findings, given the existence of some conflicting evidence. However, as Smith and Luginbuhl (1976:266) suggest, feedback can be considered an important mediator for all student performance. Hughes' (1973) experiment, which showed that praise was a major determinant of student learning, is just another study which attests to the potency of teacher feedback behaviors.

Summary

As Braun (1976:201) suggests, "it appears that the amount and quality of pupil teacher interaction offer crucial clues to the mystery of possible expectancy cues that the learner internalizes." Such is the premise underlying a number of the models which have been postulated to explain the "communication" of teachers' performance expectations to students. But the use of the notion of communication has little relevance for the expectancy phenomena unless balanced consideration be given to the "receivers of the messages." Therefore, what is the relationship between differential teacher behavior toward high and low achievers and student perceptions and behaviors, especially performances, in the classroom learning situation? This seems to be the crux of the expectancy effect--exploring more fully the process expectation effects.

While the importance of the consequences on student behavior of the expectancy effect has been reiterated by Braun (1976), Brophy and Good (1974), H. Cooper (1978), and the National Institute of Education's Panel 6 Report (1975:34), research to this effect has concentrated almost solely on product variables, namely, performance outcomes. Student perceptions of the processes which are thought to underlie the effects of teacher expectations are just becoming the focus of research effort. Much of this effort is linked directly to the application in the classroom of attributional analyses of human behavior.

Attributional Analyses of Achievement Behavior

The linking of expectancy effect research with attributional analyses of achievement-related behavior has been a recent development. The National Institute of Education's Panel 6 Report (1975:31) suggested such a linkage to be a worthwhile research domain. However, as evidenced by recent studies, this seems to have motivated more interest in process expectation effects involving teacher behavior than those involving student behavior. Meanwhile the application of attribution processes to achievement-related behavior has generated considerable research interest, including studies which are classroom based.

Attribution processes are phenomena of everyday life, including human behavior in classrooms. They are a natural aspect of behavior and need to be recognized as such. Consequently, a brief review of some of the research pertinent to attribution concepts will be presented. This will be followed by a consideration of some attributional explanations of student achievement-related behavior.

Attribution Processes

Attribution theory, as initially projected from the realms of naive psychology by Heider (1958) and developed further by Jones and Davis (1965), Kelley (1967), and Weiner, Frieze, Kukla, Reed, Rest, and Rosenbaum (1971), offers a number of concepts which can be applied to this study. As Borko and Shavelson (1978:271) point out, the theory "deals with the processes by which people integrate information to arrive at causal explanations for events." According to Heider (1958), Kelley (1967), Shaver (1975), and others, the overall attribution process consists of three phases: an observation of an action; a judgement of intention; and the making of a dispositional attribution either to the person or to the environment. The process, in Shaver's (1977:137) terms, makes up the cognitive phase of social perception, that is, the perception of the social behavior of a person.

Harvey, Ickes, and Kidd (1976, 1978) differentiate between the personal and interpersonal consequences of attribution. However, two fundamental but related concepts arise from a review of the research on both sets of consequences. First, studies such as those by Bradley (1978), Goethals (1976), Jones and Davis (1965), Kelley (1967), Schroeder and Linder (1976), Shaver (1975), and Steele and Woods (1977), provide a surprising amount of evidence on the nature and extent to which attributions are open to bias, distortion, or defensiveness--usually to fulfill self-protective or self-serving purposes of the perceiver or observer. Second, studies by Wortman (1976), Snyder (1976), Harvey (1976), and Storms and McCaul (1976), and others, suggest that there is a considerable effort made by the stimulus person or acter to maintain a sense of perceived personal control and freedom in his behavior in any situation. As an example of this Snyder, Stephan, and Rosenfield (1978) refer to attributional egotism which is the motive to take credit for success and deny blame for failure in order to enhance or preserve self-esteem. This concept of perceived personal control bears a close relationship to Goffman's (1959) self-preservation in social situations.

A considerable number of studies have extended from the seminal work by Jones and Nisbett (1972:80). They maintain that "there is a pervasive tendency for actors to attribute their actions to situational factors while observers tend to attribute the same actions to stable personal dispositions of the actor." Bell, Wicklund, Manko, and Larkin (1976), Brehm and Aderman (1977), Galper (1976), Hanse and Stonner (1978), Lowe and Hansen (1976), Miller (1976), Monson and Snyder (1977), Regan and Totten (1975), and Ross (1976) are just some of the many studies which investigated aspects of, and found evidence supporting, the Jones and Nisbett thesis. The implication for the classroom focuses on how the teacher who observes his student in action may interpret that behavior differently to the student. The studies suggest that this tendency stems primarily from differences in available information and differences in the processing of that information.

The concepts of attribution processes seem to have a direct relevance for the kind of inquiry intended of the phenomena under examination in this study. This relevance is accentuated when these concepts are applied to the cognitive (attribution) model of achievement motivation as developed by Weiner et al. (1971). As Andrews and Debus (1978:154) point out, "the key to this model is the assumption that causal beliefs about success and failure experiences have important consequences for subsequent feelings, expectancies and behavior."

Attributional Model of Achievement Motivation

Attributions "have a special significance when applied to achievement-related events. These are events for which the outcome may be judged to be either successful or a failure or some mix of the two" (Smith, 1977:2). Weiner's (1974) attributional model of achievement motivation seeks to examine the effects of attribution on student achievement motivation, and thereby performance. According to the model, causes of success and failure can be represented largely along two dimensions. One dimension is the internal-external locus of control continuum of causes, with ability and effort comprising the properties internal to an individual, and task difficulty and luck being external causes. A second dimension categorizes the same causes according to stability and instability. Ability and task difficulty are the stable causes, while effort and luck are unstable. Other possible causes and dimensions have been suggested by the studies of Weiner et al. (1971), Frieze (1976), and Cooper and Burger (1978), but research tends to emphasize the four causal factors as being the most general and salient of the causes of achievement motivation. The two main dimensions of success and/or failure causality are represented in Figure 1.

Weiner's (1974) attributional model of achievement motivation is presented in Figure 2. A number of antecedent cues act as the bases from which causal ascriptions for success and/or failure are inferred. These cues include: specific information such as past success history, social norms, patterns of performance, time spent on task; causal schemata, which is the relationship perceived between an observed event (effect) and the causes of that event; and student individual difference characteristics.

Stability	Locus of Control	
	Internal	External
Stable	Ability	Task Difficulty
Unstable	Effort	Luck

Figure 1. Weiner's Classification Scheme for Perceived Determinants of Achievement Behavior.

(Source: Weiner, 1974:52.)

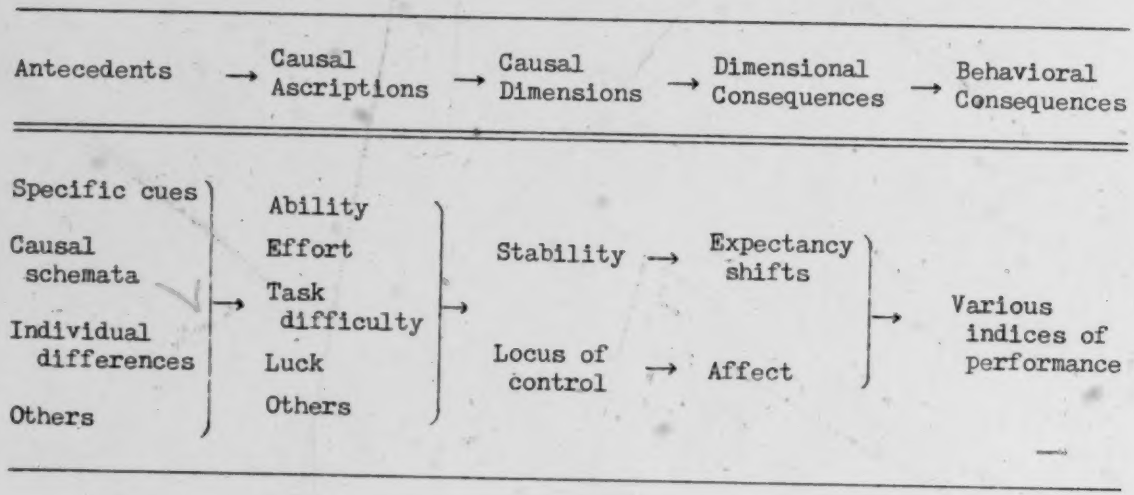

Antecedents
Causal Ascriptions
Causal Dimensions
Dimensional Consequences
Behavioral Consequences
Specific cues
Causal schemata
Individual differences
Others
Ability
Effort
Task difficulty
Luck
Others
Stability
Locus of control
Expectancy shifts
Affect
Various indices of performance

Figure 2. An Attributional (Expectancy-Value) Model of Achievement Motivation.

(Source: Weiner, 1976:184.)

Attributing an outcome to one or a combination of ability, effort, task difficulty, or luck, according to Weiner, will influence the future expectancy of success and the affective consequences of achievement performance. As Weiner (1976:182) points out, this is an integration of attribution processes with Atkinson's (1964) expectancy-value conception of motivation.

As Figure 2 indicates, Weiner's original conception of the consequences of attributing an outcome to a particular cause or causes suggested that the locus of control dimension influences the affective reactions of pride and shame. In a failure situation, when students attribute their performance to an internal cause such as lack of ability or lack of effort they are likely to experience greater embarrassment and shame than if they attribute the same performance to the external causes such as task difficulty or luck. In a success situation, an attribution to an internal cause results in greater pride and self-satisfaction, whereas success attributed to good luck or ease of task results in less pride.

The affective consequences of success and failure ascriptions have been the subject of considerable scrutiny in recent years. The discussion appears to have derived from Weiner's (1974) position that effort attributions are a more potent source of affect than attributions to ability. Nicholls (1976) and Sohn (1977) conducted studies which indicated that Weiner's statement was in need of some qualification. Nicholls (1976) found that the affective intensity of an effort attribution may well be greater than an ability attribution in the immediate achievement situation, but that over the long term the intensity of affective consequences is reversed--more affect follows an ability attribution than an effort attribution. Sohn (1977) reports that relative affective intensity depends on the emotion involved. An effort attribution seems to generate more "morally unneutral affects" such as pride and shame, whereas ability attributions probably generate more "morally neutral affects" such as happiness and unhappiness. Weiner, Russell, and Lerman (1978:82) have also investigated Weiner's (1974) original position and concluded that "it appears that affects often (but not necessarily always) are directly tied to the causes, without locus of control serving a mediating role." The findings thus far suggest that a problem has arisen in how to conceptualize locus of control within Weiner's attributional approach to motivation, for undoubtedly the internal-external dimension of causality has a considerable influence on human behavior.

As shown also in Figure 2, the stability dimension is considered to relate directly to cognitive changes in the expectancy of future outcomes following success or failure. When success is perceived by students to be caused by ease of task, the resulting expectancy is one that success probably will occur in the future, given that task difficulty is a stable cause. Attribution of failure to task difficulty results in low expectancy for success. Success attributed to the other stable cause of ability will also result in high expectancy for success, since ability normally is viewed to be constant. Likewise, failure attributed to lack of ability results in low expectancy for success in the future. When success is attributed to good luck, students might expect failure in the future, since luck is believed to be an unstable cause. Similar expectations are found for attributions to bad luck in a situation of failure. Attributions to the other unstable cause of effort in a failure situation results in higher expectancy for future success since effort is under volitional control.

As Bar-Tal (1978a:263) points out, the types of causes students use to explain their successes or failures tend to have a direct influence on their achievement-related behaviors, such as desire to approach or avoid a task, persistence of behavior, intensity of performance, and choice of tasks. Students identified as persons high in achievement needs will tend to approach achievement situations differently to students low in achievement needs because of differential attributions for outcomes with previous similar achievement situations. As Smith (1977:4) states:

> . . . people who consistently experience success are people with high achievement needs. They value success, strive to attain it, and experience it frequently. On the other hand, people who more often experience failure are defined as having low achievement needs. It is likely that these people would prefer success but for whatever reasons have come to accept failure at least in specific situations.

Students with high achievement needs are more likely to attribute success to ability and effort, will therefore experience pride and reward for their successful efforts, and will be more likely to approach subsequent achievement situations. Students with low achievement needs tend to attribute success to external causes, experience little pride for their success, and subsequently are likely to attempt to avoid achievement situations.

Because students with high needs for achievement usually attribute failure to effort, which is changeable, they will persist longer. In contrast, because students low in achievement needs usually attribute failure to ability, their persistence in a failing situation will be much lower. Finally, high achievement need students, who believe that success or failure on a task is greatly determined by effort, perform with greater intensity than low achievement need students who perceive outcomes to be attributable to causes other than effort.

A summary of the relationship between causal attributions and performance on achievement related tasks, as interpreted by Smith (1977), appears in Figure 3. This presents the probable consequences following attribution of the causes of success/failure by high and low achievement need students. As stated previously, the consequences reflect both an expectancy and an affective outcome. These, in turn, determine largely the achievement motivation of the student to perform. Ames (1978) found a similar relationship between causal attributions and performance when students were categorized on a high self-concept, low self-concept basis.

Another critical factor determining the achievement motivation of a student in an achievement situation is the student perception of tasks. Smith (1977:10-17) analyzes the nature of tasks as they relate to motivation. He considers how a student might define a required task in terms of perceived structure. "The student either consciously or otherwise sees it as structured as a skill task, a chance task, or some combination of the two" (Smith, 1977:10). The task will be

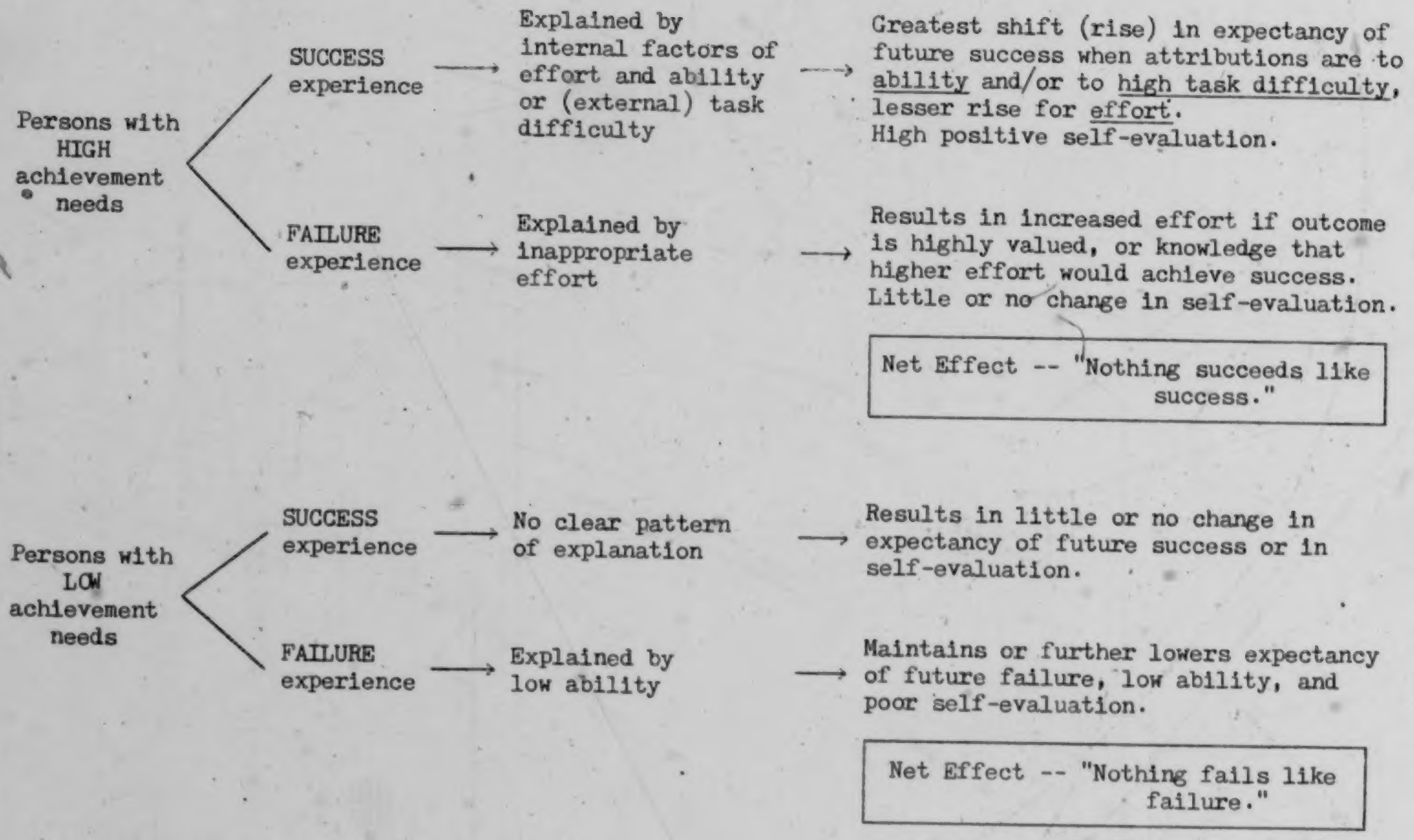

Persons with HIGH achievement needs
SUCCESS experience
Explained by internal factors of effort and ability or (external) task difficulty
Greatest shift (rise) in expectancy of future success when attributions are to ability and/or to high task difficulty, lesser rise for effort.
High positive self-evaluation.
FAILURE experience
Explained by inappropriate effort
Results in increased effort if outcome is highly valued, or knowledge that higher effort would achieve success.
Little or no change in self-evaluation.
Net Effect -- "Nothing succeeds like success."
Persons with LOW achievement needs
SUCCESS experience
No clear pattern of explanation
Results in little or no change in expectancy of future success or in self-evaluation.
FAILURE experience
Explained by low ability
Maintains or further lowers expectancy of future failure, low ability, and poor self-evaluation.
Net Effect -- "Nothing fails like failure."

Figure 3. Schematic Representation of Research Results of Differential Effects of Success/Failure on High/Low Achievement Need Persons.

(Source: Smith, 1977.)

defined as chance when the student feels the outcome of events is controlled by external factors. That is, his success or failure will depend on factors other than ability and/or effort. Alternatively, when the student defines the task as skill structured, the outcome will be controlled by the internal factors of effort and/or ability.

A second basis by which tasks in achievement situations can be analyzed is the extent to which a student perceives a task as easy or difficult. Students with high achievement needs more often choose tasks of intermediate difficulty than do students with low achievement needs. Such a level of difficulty, according to research cited by Smith (1977:13), arouses the greatest emotional or affective reaction in these students and, as well, provides maximum information feedback about a student's capability and means to improve performance.

Some interesting additional student perceptions of tasks have been reported by Doyle (1978). He was able to conclude that, for a student, the achievement of a task represented a performance-grade exchange. As far as the students were concerned, the most important goal was to acquire the performance capabilities which have the greatest likelihood of receiving a positive evaluation by the teacher, hence a favorable performance-grade exchange. Success, therefore, was dependent upon students finding the solution strategies for accomplishing a particular task which were both reliable and production efficient. Erlwanger's (1974) study, however, showed that students may not always use the most efficient solution strategy, so long as success is achieved. Doyle's (1978) discussion seems to underscore the differential consequences facing students who attribute success and perception of task structure to internal causes, such as their own ability and effort, and those students who attribute their success and perception of task structure to external causes.

As Bar-Tal (1978b:5) points out, the attributional analysis of achievement-related behavior can apply in the classroom situation to teachers' perceptions and behaviors as well as to those of students. Teachers' causal perceptions of their students' successes or failures, using the same attributional structure, probably are as significant as students' causal perceptions, especially in the extent to which they match or mismatch. As the teacher's causal perceptions are thought to underlie the performance expectations held for a student, an attributional perspective seems particularly appropriate for attempting to contribute to the explanation of the expectancy effect. In the following section, a review of some of the interrelationships between the teacher's causal perceptions and behaviors and the student's causal perceptions and behaviors will be presented.

Teachers' and Students' Attributions of Students' Performance

Bar-Tal (1978b:2) presents a useful framework for understanding the perceptions and behaviors of students and teachers in terms of Weiner's attributional model of achievement-related behavior. He presents three specific questions pertinent to this study:

1. how students' causal perceptions of their successes and failures determine their achievement-related behavior;
2. how teachers' causal perceptions of their students' successes and failures determine their behavior toward students; and

3. how teachers' behavior influences students' causal perception of successes and failures.

The review that follows presents evidence in support of these interrelationships between the students' and teachers' causal perceptions and behaviors.

The relationships between students' attributions of their performance and their achievement-related behavior. In a review of researches which focused on causal perceptions of students, Bar-Tal (1978b) described three studies which demonstrated that elementary students attribute academic successes and failures to a variety of causes. However, the most common causes were effort, ability, mood, and task difficulty. While two of the studies indicated little or no difference in the attributions for successes or failures, a third study reported that students tended to attribute success mainly to external causes and failure mainly to internal causes. The studies indicate that students can clearly explain the causes of their successes and failures in academic situations, although more research of a naturalistic kind is needed before any definite patterns of findings can be claimed.

A number of studies have investigated the relationship between students' causal perception of success and failure and achievement-related behavior. Many of these seem to have focused on the consequences of failure attributions, investigating the phenomenon described by Seligman (1975) as "learned helplessness." As Brustein (1978:8) reports, learned helplessness pervades the classroom where "failure-prone children perceive their behavior as having no impact on their environment; they are powerless to control the outcomes of events. These children perceive their failure as independent of their actions." Such effects, as H. Cooper (1978:26) points out, result from a feeling of little or no perceived personal control, that is, in Kukla's (1972) terms, little effort-outcome covariation. Dweck and Goetz (1978:157) categorize students as helpless on the basis of their tendency to disregard effort as a determinant of failure. Students who tend to perceive effort as a determinant of failure are categorized as mastery-oriented.

The linking of deterioration in performance following failure has been well established by the researches of Andrews and Debus (1978), Diener and Dweck (1978), Dweck (1975), Dweck and Repucci (1973), Kuiper (1978), and Seligman (1975). These studies revealed that helpless students tended to attribute failure to lack of ability. Equally convincing evidence has been provided by the studies of Andrews and Debus (1978), Dweck (1975), and Dweck and Repucci (1973) regarding the successful use of training procedures to redirect the attribution of poor performance, normally to effort. As Brustein (1978:8) states, "the success of 'attribution retraining' lies in the fact that the children were supplied a strategy to control the traumatic experience of failure." The intention and direction of these cognitive retraining procedures would appear to resemble closely the training programs developed by deCharms (1976).

deCharms' (1968, 1976) work on personal motivation incorporates attributional aspects. His origin-pawn concept is a specific application of attribution of internal causality to oneself. As deCharms (1976:5) states, "to help a person to be an origin is not to determine his goals but to help him develop a commitment and purpose so that he can reach his own goals more effectively." The basic elements in the conditions which promote origin behavior, according to deCharms (1976), involve self-study, internal goal setting, planning and goal-directed behavior, and personal responsibility. That these conditions can be translated into a training program in the school setting was successfully shown by deCharms (1976).

The studies presented seem to indicate that the kinds of causes students use in explaining successes and failures will determine their achievement related behavior. The evidence consistently shows that students who attribute failure to unstable causes, such as low effort, are more persistent in their behavior than students who attribute their failure to a stable cause which is perceived to be unchangeable. Consequently, intervention programs designed to alter student attributions of failure to personally controllable, unstable causes have met with success.

The relationships between teachers' attributions of students' performances and their behavior toward the students. The interrelationship of causal perceptions by teachers and their effect on behavior toward students has been the subject of extensive research. The National Institute of Education's Panel 6 Report (1975:36) urged researchers "to determine what attributions are made by teachers for the performance of their pupils, to determine the consequences of these attributions for pupil behaviors, and to discover methods for changing attributional decisions." After citing some research evidence, Bar-Tal (1978b:12) concludes that teachers of elementary level students tend to attribute their students' successes to student effort and interest, their own quality of explanations, and in part to the students' home conditions. Teachers tended to attribute failure to students' lack of effort, difficulty of the material, and inappropriate home conditions. These research results also found support for Snyder, Stephan, and Rosenfield's (1978) notion of "attributional egotism." A definite tendency prevailed for teachers to share the credit for success with the students but distribute blame for student failure to causes external to the teacher.

Teachers' causal perceptions of their students' performances probably are associated with their behaviors towards students through the mediating influence of teacher performance expectations of students. Most reviewers of research into the formation of teacher performance expectations of students, such as Braun (1976), Brophy and Evertson (1976b), and H. Cooper (1978), showed that teachers particularly noted student past achievement, intelligence of the student, and sex of the student. A related line of research has been concerned with how information concerning a student influences teachers' performance expectations of students. This has evolved from Weiner's (1974:21) statement that:

> . . . ascriptions of an outcome to stable factors produce greater typical shifts in expectancy than do ascriptions to unstable factors. A typical shift is defined as an increment in the subjective expectancy of success following a success experience and a decrement in expectancy after a failure.

Some evidence is available which indicates that teachers do form differential expectations on the basis of mainly stable causes.

Weiner and Kukla (1970:5) showed that student teachers tend to reward more favorably students who are successful, who are of high ability, and who are highly motivated. Bar-Tal and Saxe (in press) found that, from the causes provided regarding a student's performance, teachers formed their expectations mainly from ability (the greatest effect), effort, and luck. Bar-Tal (1978b:14) cites research undertaken by Darom and Bar-Tal (1977) which showed that "the more success or failure was attributed to stable causes such as ability, easy subject matter or easy test, the more future outcome was expected to be similar to the prior outcome."

Teachers' performance expectations for students have been shown to influence teachers' differential behavior toward students. Most of the research evidence for this relationship was reviewed in an earlier section, but a further model for "expectation communication" has been postulated by H. Cooper (1978). This model is significant for it focuses upon some attributional determinants for differential teachers' behaviors toward students. Attribution research suggests that many persons endeavor to maintain a sense of perceived personal control and freedom in their behavior in any situation. Cooper postulates the thesis that this concept might provide the basis of the classroom expectancy effect.

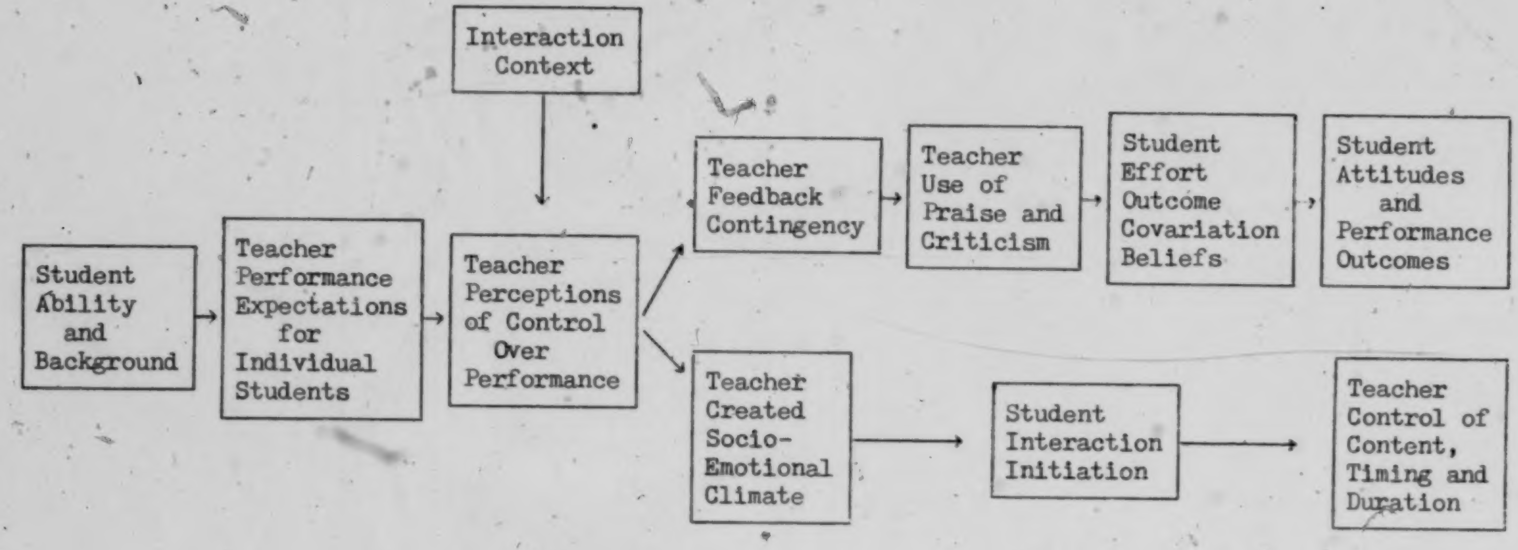
In many respects, Cooper's still largely unresearched model contains similar features to earlier models that seek to explain how teacher expectation effects are communicated to students. However, the distinguishing feature of this model is the hypothesized vesting of the causal sequence in the teacher's motive to retain a sense of perceived personal control over classroom interactions and student performance. According to H. Cooper's (1978:15) model, "expectations and context characteristics influence teacher perceptions of control over student performance."

The model, as represented in Figure 4, proposes:

> 1) that teachers form differential expectations for students' performances; 2) that expectations, in conjunction with the interaction context, influence teacher perceptions of control over student performance; 3) that control perceptions influence teacher feedback information and the socio-emotional climate of the classroom; 4) that feedback contingencies influence student beliefs concerning the importance of effort in producing personal outcomes; and 5) that effort-outcome perceptions influence the quality of student performance. (H. Cooper, 1978:14)

Differential expectations are formed such that low expectation students and high expectation students are identified. But teacher perceptions of control over student performance are largely context based. Consequently, H. Cooper suggests that some situations of classroom interaction provide a greater sense of control for the teacher than others. Teacher-initiated interaction as compared to student-initiated interaction, and private interaction as compared to public interaction settings are two such situations. According to the model, teachers are considered to feel the greatest personal control over student performance in teacher-initiated private interaction settings, and the least personal control in student-initiated public interaction settings. The crucial variables of these situational factors are content of the interaction, timing of the interaction, and duration of the interaction.

H. Cooper (1978:17) states that these situational factors are likely to interact with student characteristics. High expectation



Interaction Context
Student Ability and Background
Teacher Performance Expectations for Individual Students
Teacher Perceptions of Control Over Performance
Teacher Feedback Contingency
Teacher Use of Praise and Criticism
Student Effort Outcome Covariation Beliefs
Student Attitudes and Performance Outcomes
Teacher Created Socio-Emotional Climate
Student Interaction Initiation
Teacher Control of Content, Timing and Duration

Figure 4. A Model for Expectation Communication and Behavior Influence

(Source: H. Cooper, 1978)

students are likely to succeed regardless of situational factors. Low expectation students' success, on the other hand, should depend to some extent on difficulty of the task and on the amount of time available to bring about the success, that is, context factors. Therefore, by manipulating some of the context variables, Cooper and Seymour (1977) found that teachers may feel they can exert some control over low expectation students' performance. Cooper's model suggests that, as they find student-initiated public interaction settings least controllable, teachers might be expected to take steps to avoid such situations with low expectation students.

H. Cooper (1978:18) explains that teachers who have a need for a sense of perceived personal control could manipulate classroom interactions with low expectation students through differential patterns of feedback and the kind of classroom climate established. As found by H. Cooper (1977), by using feedback and expression of affect, teachers can inhibit low expectation student-initiated public interactions and thereby retain a sense of perceived personal control over these students. A study by Entwisle and Webster (1972), involving teacher use of praise, realized similar findings. The feedback and affect used with high expectation students will be more often based on the specific quality of the performance, such as effort. The need for a sense of perceived personal control over their interactions would appear from the model to be less of a matter for concern.

Finally, the relationship between teacher feedback and effort contingent outcomes for students links Cooper's model with that of

Weiner's (1974) attributional model of achievement motivation. Low expectation students will perceive little effort-outcome covariation in their performance. For them, this represents very little personal control, but for the teacher the situation reflects considerable perceived personal control. Quantitative and qualitative aspects of feedback and affect by the teacher means the low expectation student is likely to attribute his success or failure to external and/or unstable causes. There seems every likelihood that such teacher behavior will influence the student's self-image.

H. Cooper's model of expectation communication and performance influence intrudes into the review of literature and research pertaining to the relationship between teachers' behavior and students' causal perceptions. Given the nature of the expectancy effect, expectations formed on the basis of causal perceptions of students' performances do influence teachers' behaviors. These, in turn, probably affect students' causal perceptions of successes and failures. The next section reviews the research on this relationship.

The relationships between teachers' behavior toward the students and the students' attributions of their performance. Students' causal perceptions of success and failure seem to be under the influence of teacher behavior. Bar-Tal (1978b:16) cites a classroom-based study by Blumenfeld, Hamilton, Wessels, and Falkner (1977) which suggests that teachers transmit to students three kinds of messages, all of which influence students' causal perception:

1. Explicit attributional feedback which refers to causes contributing to success or failure; emphasized mainly ability

and effort for achieving positive outcomes.

2. Explanations for behavioral expectations and evaluative feedback; were of an extrinsic nature such as referral to authority, rules, or circumstances.
3. General statements referring to social or procedural expectations; consisted more of threats and punishments than rewards.

However, the most notable evidence regarding the relationship between teachers' behaviors and student causal perceptions seems to be provided by the sex differences studies. Attribution studies in social psychology, such as those undertaken by Deaux (1976) and Deaux and Farris (1977), have noted that a tendency exists for males to attribute success to ability and failure to unstable causes, and for females to attribute success to luck and failure to ability. Dweck and her associates have investigated sex differences in attribution as they function in the classroom. Dweck and Goetz (1978:165-173) concluded that the differential causal perception of boys and girls in the classroom is due to differential teacher behaviors. Dweck, Davidson, Nelson, and Enna (1978:274) found that teachers were overall more critical of boys and used more negative evaluation in both academic and non-academic matters. Consequently, boys more easily attributed negative feedback to the attitude of the teacher rather than to the intellectual quality of their performance. When boys did view the negative feedback to be contingent on the quality of their work they blamed lack of effort, for teachers had tended to attribute boys' failures to lack of motivation. With girls, teachers provided largely positive assessments and only used negative feedback for girls' intellectual failures, without emphasizing motivation as a cause. Girls tended to attribute negative feedback to the intellectual quality of their work and perceived lack of ability as the reason for failure.

Regarding positive evaluation, the reverse effect, while being consistent, was less pronounced. Because girls received overall more positive feedback in both academic and non-academic matters, they attributed teacher praise contingent on the quality of work more to the teacher's favorable attitude or non-intellectual aspects of their performance. Positive feedback for boys tended to be specific for academic performance, hence encouraging an attribution by boys to ability. This differential feedback of teachers influences directly boys' and girls' causal perceptions of success and failure.

Other studies, such as those of H. Cooper (1977) and Entwisle and Webster (1972) which were reviewed earlier, also indicate ways in which teachers' differential behaviors are related to students' causal perceptions of performance. Weinstein and Middlestadt (1978:21) found, in a classroom-based study, that differential teacher treatment is perceived by students and, as a consequence, students learn a great deal about the achievement hierarchy of the classroom. This finding led Weinstein and Middlestadt (1978:22) to suggest that "the expectations of classroom peers for a student's performance can be as critical to the student's own developing self-expectations as those of the teacher." Such a suggestion raises the need to consider briefly the impact of significant others on students' self-attributions and self-expectations.

The significant other. The notion of significant others, according to Webster and Sobieszek (1974), was initially suggested by H. S. Sullivan in 1947. He defined significant other as "one whose opinions 'matter' to the individual, someone whose approval he desires, and whose censure he wishes to avoid" (cited by Webster & Sobieszek, 1974:119). Additional notions have been proposed to this original concept. For instance, a significant other's "performance evaluations are likely to be accepted by the actor and used as a basis for forming his expectations for himself and other actors" (Webster & Sobieszek, 1974:124). As well, the significant other is viewed as having the competence to evaluate, both in terms of his greater ability and his formal status. Kash and Borich (1978:12) differentiate between what they refer to as a significant other and a salient other. To them the significant other is "an individual selected and unconditionally valued by the developing self as a source of self-reflection and an interpreter of the behavioral dialogue." The salient other, on the other hand, is a person who functions as a significant other only for specific events and is valued for a specific reflection of the self. Whereas the teacher appears as a significant other to the student, a hockey club coach may fulfill the role of a salient other.

In the classroom learning situation, significant others for a student may be the teacher, certain peers, perhaps the principal, and probably the parents. Two studies have examined the influence of significant others in modifying a student's self-evaluation, and hence his self-expectation. Webster and Entwisle (1974) and Rappaport and Rappaport (1975) both demonstrated the effect with small samples of disadvantaged students. The influence of significant others should be a relevant notion in research dealing with self-expectations of students.

Summary

Attribution theory and its application to achievement-related situations in general, and to classroom learning situations in particular, constitutes a rich line of literature and research. Because attributions are phenomena common in everyday existence, their validity as research variables for human behavior seem more credible. Also, because the research tradition of attributions reflects, in Glaser and Strauss' (1967) terms, more of a grounded theory developmental process, the research area seems very applicable to descriptive, exploratory studies of students functioning in their regular classroom environment.

That attribution processes can prove to be relevant to the study of the expectancy effect has been established in this section of the review of related literature and research of the study. The attributional analyses of behavior probably facilitate the most specific and probing inquiry yet undertaken.

Summary

This chapter reflects the blending of the two domains of literature and research underlying the investigation. One domain, teacher expectation research, is a relatively recent area of inquiry derived from the classroom climate tradition of research in teaching. The other domain, attributional analyses of students' and teachers' behavior, has evolved from attribution theory, a rapidly developing area of inquiry in social psychology. The dynamics underlying the expectancy phenomena may well be described, interpreted, and explained by these two related research domains.

A theme recurring throughout the expectation research and the research in teaching generally is one of reconceptualizing and refining the research variables. The recognition of inadequacies of research variables has resulted in a surge of interest with the mental life of classroom participants, and very recently this change has been adopted increasingly in the research on teacher expectations. Two outcomes of this expansion of variables to incorporate the mental lives of students and teachers have been, first, the increased hopes for finding explanations of the dynamics or mechanisms underlying the expectancy phenomena and, second, the application of attribution theory and research to assist in this search for explanations.

Access to the thoughts and feelings of students and teachers should help in understanding the interrelationships between and among teachers' perceptions of students and their behaviors, teachers' causal perceptions of students' performances, teachers' behavior, and students' perceptions of teachers' behaviors. Hopefully, the dynamics of the process expectation effects will be explained by this approach.

This study is one of very few researches undertaken thus far which have examined in depth students' perceptions of the processes thought to underlie the expectancy effect. Weinstein and Middlestadt

(1978:2), who undertook such a study, point out that it is imperative to approach process expectation effects from the student's position for a number of reasons. First, performance outcomes of achievement, with one or two exceptions, have been the only student variables considered so far in classroom expectancy research. Second, research on student perceptions into classroom climate factors have, in the past, used classroom means of student observations, thereby discounting the important effects of individual perspectives. A third reason for examining student perspectives on the expectancy effect is the recognition of the differential perspectives of the student and the teacher involved. This reason is underlined by the significance of the Jones and Nisbett (1972) thesis of actor-observer discrepancies in causal attributions of an event. However, as Harvey, Ickes, and Kidd (1978:153) point out, maybe this reason reflects a wider research discrepancy that only now is being handled, namely, the virtual absence of research attention given "to the interactive nature of inference making in social relationships and to the special problems that arise when one person makes attributions about another's attributions." This concern is related to Weinstein and Middlestadt's (1978:4) fourth reason that "student perceptions may serve as intervening variables which mediate the effects of teaching behaviors on achievement."

Given the dearth of research evidence on students' thoughts and feelings in the learning situation, this study--a classroom-based research--should contribute to the growing body of knowledge underlying the teaching/learning process.

Chapter III

DESIGN AND PROCEDURES

Overview

This chapter begins with a description of and a rationale for the design of the study, a description of the subjects, the specific problems to be investigated, the assumptions underlying the research, and limitations of the study. In subsequent sections there are accounts of the data collected in the study, the major research methodologies used, and the phases of the study which include descriptions of the research procedures followed.

Design

The research project was planned as a set of four case studies designed to facilitate the exploration and description of the expectancy phenomena as viewed by students. The case study method was considered an appropriate research design for two main reasons. The first reason derives from the fact that students' conceptions of self-performance in classroom achievement situations are basically unknown. In order to provide a data base, intensive studies of individual cases should be undertaken to establish some understanding and explanation of what Harré and Secord (1972:133) referred to as the generative mechanisms of social behavior.

The case study method catered to the exploratory intention of the research. In Kerlinger's (1973:406) terms, such an exploratory study should attempt "to discover significant variables in the field situation, to discover relations among variables, and to lay the groundwork for later, more systematic and rigorous testing of hypotheses." In this way the study would be conforming to the first phase of Rosenshine and Furst's (1973) descriptive-correlational-experimental loop for research in teaching.

The second main reason for adopting the case study approach centered on the fact that the research was set in the context of a regular classroom during normal teaching/learning sessions. This naturalistic setting comprized an extremely complex aggregation of intrapersonal, interpersonal, and environmental processes over and above the expected occurrence of the learning processes. The case study method, by its approach to the phenomena and its informal techniques for data gathering, seemed to offer the most effective means for studying the realities of the classroom. Stake (1978:7) underscores the case study in these situations when he states that:

> . . . most case studies feature: descriptions that are complex, holistic, and involving a myriad of not highly isolated variables; data that are likely to be gathered at least partly by personalistic observation; and a writing style that is informal, perhaps narrative, possibly with verbatim quotation, illustration, and even allusion and metaphor. Comparisons are implicit rather than explicit. Themes and hypotheses may be important, but they remain subordinate to the understanding of the case.

Similarly, MacDonald (1978) noted that practice-based research avoids the constraints of formal research because it is concerned essentially with trying to find insight into existing reality rather than developing some internal reality.

While the intensive, small-scale nature of the research facilitated the desired micro-level study of the phenomena under investigation, it also accommodated certain practical constraints such as manpower, resources, and time.

The Subjects

Selection of the Teacher and Student Subjects

The choice of school for the research was determined largely by a teacher at the required grade level who volunteered to participate. The school was a typical large elementary school located in a residential community in a large urban center. The Grade 6 class of 26 students was accommodated in a temporary classroom.

The selection of Grade 6 level of elementary students was based upon findings in the pilot study which indicated that: 1) younger students were less comprehensive and articulate in verbalizing thoughts and feelings about self-performance; and 2) peers seemed to exert a greater influence on Grade 6 students' behavior, thereby sharpening an awareness of self-performance in the learning situation.

Selection of students. From the class, four target students were selected from the 21 students whose parents consented to their participation. These four target students are the four case studies of this research. Two of these were high achievement/high motivation students and two were low achievement/low motivation students. The research literature suggested that differences exist in the perceptions and behaviors of these two categories of students. The balance of the students were used as decoy students, four of whom were considered as "back-ups" to the target students.

Target students were identified by use of pre-observation data of the students obtained from five sources. First, the Intellectual Achievement Responsibility Scale (IAR) developed by Crandall, Katkovsky, and Crandall (1965) provided student measures on an internal-external locus of control scale. The scale is reported to assess students' beliefs that they, rather than other people, are responsible for their intellectual-academic success and failure. Of particular significance, as Crandall et al. (1965:93) point out, the scale "limits the source of external control to those persons who most often come in face-to-face contact with a child, his parents, teachers, and peers." The scale also limits students' beliefs in locus of control to intellectual-academic achievement situations. The scale, with some accompanying psychometric data, is presented in Appendix A.

The second source of data used to assist in identifying the target students was the Projected Academic Performance Scale (PAPS), a student self-expectation scale recently developed by Chapman and Boersma (1978). The scale measures student self-expectations in school subjects on both academic and affective criteria. For each of the school subject areas of spelling, reading, language arts, mathematics, social studies, and science, students were required to predict for the current year, and over the long term, their self-expectations of ability to learn the subject matter, of enjoyment of the subject matter, and of performance in relation to other students.

Psychometric data on the PAPS are in the process of being published but, according to Chapman (1979), acceptable external validity and test-retest reliability have been established.

The students' levels of achievement in mathematics, the subject area chosen for this study, comprized the third source of data. These were obtained from the students' cumulative records, where the levels of achievement were presented as percentiles for all Grade 6 students within the school district.

A fourth source of data used in the identification of target students consisted of the teacher's comments and ratings of the students' performances. Prior to the observation phase, the researcher adopted the role of "counselor" in Cooper and Baron's (1977) study by discussing with the teacher the relative progress and performance of each student in the subject area of mathematics. In the course of her comments, the teacher rated the students' achievements in mathematics as either above average, average, or below average.

Finally, the researcher made an assessment of the suitability of potential target students and this data contributed to the final selection. Factors considered by the researcher, following interviews with the students, included ease of establishing rapport with the student, student's "verbalness," and student's clarity of voice and speech as revealed by audio-cassette recordings.

The 10 students on the short list were observed carefully during the familiarization phase of the study which included three rehearsals of the research procedure. Students who best fitted the criteria and who proved to be consistent during the pre-observation phase were chosen as the four target students. Table 1 provides a summary of the information about the target students.

The Lesson Context

Mathematics lessons were chosen as the context for the study. The formal, disciplined nature of the subject matter, as described by Lovell (1962), was believed to accentuate the achievement-related nature of the situation. All the lessons involved a study unit on motion geometry--from the introduction of the unit through to the end-of-unit test. The study unit followed the material prescribed in the curriculum guides for Grade 6 mathematics.

While the potential uniqueness of teacher and student behavior in mathematics might well be attributable to the characteristics of the subject matter, research by Evertson, Anderson, Edgar, Minter, and Brophy (1977) would suggest that this is not so. In the first extensive study following Shavelson and Dempsey-Atwood's (1976) statement on the application of generalizability theory to classroom behavioral data, Evertson et al. (1977) found consistency of behavior of the same student when observed in junior high school mathematics and English classes. The stable variables were classified by Evertson et al. (1977:54) in four ways:

> . . . the extent to which a student functioned as an independent, task oriented worker; the extent to which the student initiated his or her involvement in interactions; the consistency of the quantity and quality of teacher-student contacts; and the tone of the interactions.

The results of this study were judged to have relevance to the current study given the proximity of grade level of the students.

Table 1

Summary of Objective Type Information Used in Selection of Target Students

Name	Sex	Age	IAR (Locus of Control)			PAPS (Self-expectations)		Maths Achievement Percentile	Teacher's Rating
			Internal Success	Internal Failure	Total	Maths Subscore	Total		
Tina (T)	F	11	14	12	26	25	149	72	High
Mike (M)	M	11	15	9	24	25	145	89	High
Lisa (L)	F	11	13	11	24	17	100	5	Low
Greg (G)	M	11	16	10	26	24	147	9	Low
Class Mean			13	11.3	24.3	23.3	128.8		

Specific Problems

The specific problems investigated related to four major areas.

1. What are the characteristics of students' behavior during a lesson?
    - What categories of student overt behavior occur during a lesson?
    - What is the frequency of the various student overt behaviors?
    - What are the relationships between student overt behaviors and lesson situations?
    - What categories of student covert behavior are reported to occur during a lesson?
    - What is the frequency of the various student covert behaviors reported by students?
    - What are the characteristics of a student's reported covert behavior which pertain to self-performance?
    - What comparisons can be drawn between the reported covert behavior related to self-performance of high achievement/high motivation students and low achievement/low motivation students?
2. What are the conceptions of self-performance that students appear to develop in classroom achievement situations?
    - What sorts of ideas, beliefs, views, emotions, lines of reasoning make up a student's conception of self-performance?

What sort of relationships exist among the ideas, beliefs, views, emotions, and lines of reasoning?

What seem to be the origins of these ideas, views, beliefs, emotions, lines of reasonings of a student's conception of self-performance?

What role does a student's causal perception of success and failure appear to fulfill in a conception of self-performance?

What, if any, are some of the characteristic qualities of a student's conception of self-performance?

3. From an attributional perspective, what phenomena characterize teacher expectancy effects?

   How do a student's causal perceptions of his successes and failures determine his achievement-related behavior?

   How does a teacher's behavior influence a student's causal perception of his successes and failures?

   How does a teacher's causal perception of her students' successes and failures determine her behavior toward students?

   What is the nature and extent of consensus between the teacher and student regarding the causal perceptions of the student's successes and failures?

4. How effective are stimulated recall procedures when used as a research technique for observing the covert behavior of classroom participants?

   What difficulties or problems are likely to be encountered in the use of stimulated recall with the teacher and the students?

What appears to be the potential of the stimulated recall methodology for investigating student interactive thoughts?

Assumptions

This investigation of the students' perceptions of the processes underlying the expectancy phenomena was based on three substantive assumptions:

1. That the student entered and participated in achievement-related situations with thoughts and feelings about his self-performance.
2. That the student's conception of self-performance influenced his achievement-related behavior.
3. That the students, in some form and to some extent, were influenced by the expectancy effect phenomena.

The following two assumptions in the study pertained to methodological issues:

1. Introspective reports produced under conditions of stimulated recall from videotape recordings enabled effective and legitimate data from the teacher's and the students' covert behavior to be obtained.
2. An adequate characterization of each student's conception of self-performance and its relation to learning experiences was derived from all the sources of data used, including the

introspective reports.

Limitations

The major limitations of the study were:

1. The sample of school, teacher, students, and lessons was small.
2. Random sampling was not used.
3. Classroom observation was only of a short time period and in only one subject area.
4. The problem of asking elementary school students introspective and reflective questions and receiving reliable usable answers was one that was difficult to overcome.
5. By not including teacher self-expectations, a significant component of the interactive expectation process may have been excluded.
6. While essentially a naturalistic study in character, certain observer obtrusive effects probably distorted the behaviors observed.

These limitations precluded the making of generalizations beyond the individual teacher and students involved in the study. However, the findings may suggest what other researchers might look for in similar or related situations.

Data and Data Sources

The kinds of data for considering the stated research problems and the sources of, or procedures used to obtain the data are outlined below.

Videotapes of Lessons

Ten mathematics lessons of 45 to 60 minutes duration were recorded on videotape. These videotapes were used: 1) to stimulate the recall of the teacher's and students' interactive thoughts; and 2) as a data source for coding student overt behavior and classroom interactions between the teacher and target students.

During the recording of the videotapes, a lesson overview was prepared which described the sequence of the lesson activities, the development of mathematical ideas, and the occurrence of teacher-student interactions.

Interviews

Interviews with the teacher and the students yielded several kinds of data depending on the type of interview conducted.

Stimulated recall interviews with the teacher and the students were conducted on the same day as the lessons were recorded. These interviews yielded the teacher's and students' interactive thoughts. The interviews, ranging from 30 to 60 minutes with the teacher, 20 to 40 minutes with the target students, and 10 to 30 minutes with the decoy students, were all audiotaped. Transcripts of all interviews were then prepared. Procedures and techniques for structuring some aspects of the stimulated recall interviews with the teacher and the students were developed from those used by Marland (1977) and C. Cooper (1978) and are presented in Appendix B.

Interviews intended to yield data on student self-performance took two forms. First, a pre-lesson interview and several post-lesson interviews were conducted with target students during the observation phase. Also a 10 minute pre-test interview and a 10 minute post-test interview were conducted with each of the target students. Interview schedules were developed for these interviews (see Appendix C). All interviews were recorded on audio-cassette tape-recorders and transcripts prepared.

A second form of interview designed to yield self-performance data was integrated with the stimulated recall interviews. As opportunities arose, such as particular incidents in the lesson, pertinent interactive thoughts reported by the student, or relevant non-interactive comments made by the student, the researcher manipulated the interview to inquire into student self-performance phenomena. A rationale for, and procedures used with, the integrated interviews are described later in this chapter.

Pre-observation phase interviews were conducted with the teacher and the students primarily to obtain data which would assist in the selection of target students. These interviews provided a variety of introductory data, some of which were relevant to the expectancy effect.

The Low Inference Observation System: A Revision of the Expanded Brophy-Good Teacher-Pupil Dyadic Interaction Classroom Observation System

This instrument is a detailed low-inference observation system. The system provides a means of recording naturally occurring sequences of teacher-pupil interaction in elementary classrooms as well as every dyadic interaction between the teacher and individual students. Also, the instrument takes account of some of the contextual differences in classroom interactions and, as explained by Brophy and Good (1969, 1970) and Brophy and Evertson (1973), is based on real and psychologically meaningful units. The authors report that it is possible to train coders to reach an 80 percent agreement criterion using a strict definition of agreement.

The instrument yields both quantitative and qualitative data. Each video recording of the lessons provided the data source from which the dyadic interactions between the teacher and each of the target students were coded. The resulting data of teacher-student interactive overt behavior contributed to the attempted analysis and explanation of the expectancy effect phenomena.

Because the teacher in this study used a cordless microphone, the researcher was able to record private dyadic interactions between the teacher and the student, that is, those interactions normally intended only for the hearing of the two participants, such as quietly conducted desk supervision. The existing system of Brophy and Good's was not adequate to categorize these interactions in detail. Therefore, the researcher redesigned the sections dealing with student initiated dyadic teacher-pupil contacts and teacher afforded dyadic contacts, employing the kinds of categories Brophy and Good used in the public response opportunities. This set of additional categories facilitated a much sharper and more detailed analysis of interaction behavior between the teacher and individual students. The revised low inference system is fully outlined in Appendix D.

Field Notes

A variety of field notes were recorded throughout the familiarization and observation phases of the study. These notes recorded general contextual information including community, school, classroom, the subject area, the unit of study, and extra-curricular matters that influenced classroom behavior, such as team soccer, Hallowe'en, Remembrance Day, school photographs, visits of art exhibitions, etc. Also recorded in the field notes were specific data relating to the phenomena being researched. Target student behaviors and related teacher behaviors not observed during the interviews or recorded on videotape were noted whenever they were observed to occur. Such field notes were informal, anecdotal, and recorded at the moment.

Research Methodology

This research required the investigator to study the mental life of students and the interactive thoughts of the teacher. For this purpose, a refinement of the observation-interview method was selected as the major data gathering methodology. The observation-interview method is based on observations, discussions, and interviews with participants over a period of time. Stimulated recall methodology offered the possibility of condensing these three components of the observation-interview method into a more intensive and analytical interview approach.

Stimulated Recall Methodology

According to Conners (1978b:1):

> . . . stimulated recall is a branch of introspective methodology in which audio and/or visual cues are presented to facilitate a subject's recall of the covert mental activity which occurred simultaneously with the presented cue or stimuli.

At the classroom level, stimulated recall methodology tends to involve the recording of a lesson or event on audiotape or videotape. Classroom participants, either the teacher or the students, at a later point view and/or listen to the recording. The stimulus tends to assist the person in recalling the thoughts and feelings experienced in the actual lesson or event. The expression of these interactive thoughts is then recorded on audiotape.

Marland (1977:37) points to three uses of stimulated recall--in studies of teaching and learning, in medical education, and in psychotherapy and therapeutic counselor education--but as a research tool it does not have a long history. This lack of extensive use can largely be attributed to a tradition of research skepticism held toward the use of introspective techniques in the behavioral sciences generally. However, as Marland notes, the commonly expressed opposition, which tends to focus on the potential for error in introspection, has been countered in part by recent developments in research, including the rise in interest of stimulated recall. A gradually changing research attitude seems to be prevailing, as if in a response to the call by writers such as Harré and Secord (1972:151, 154) who have advocated a return to the use in social behavior research of participants' accounts of realities and phenomena.

Both Conners (1978a) and Marland (1977), in their use of stimulated recall methodology, attended to the precautions to be taken to enhance the probability of accurate recall of thoughts, which was the critics' major objection to the technique. These precautions include the interviewer's use of skilfull questioning techniques, the small time-lag between recall of thoughts and the actual event (according to Bloom, 1953, this should be less than 48 hours), and the appropriate preparation of the interviewee.

The problem of accuracy of recall of thoughts raises the issue of their validity. As Conners (1978a:294) notes, three linked problems are thought to underlie accuracy of recall, namely, "can the individual remember, secondly, is the individual reporting his actual thoughts, or is he distorting them for some reason, and thirdly, is he only selectively reporting his thoughts?" While there is no single way to establish the validity of the individual thoughts, Marland (1977:227) reports that a logical consistency was perceived between interactive thoughts and events on videotape. Conners (1978a:295) conducted a number of checks which, according to Gaier (1954), enable a researcher to infer the validity of the individual's reports. As with Marland, Conners was able to infer that acceptable validity was established. Therefore, as Marland (1977:227) concludes, "validity and reliability can be assumed but not demonstrated or guaranteed."

Most classroom researchers who use stimulated recall methodology express positive comment about the quantity and quality of data which is yielded. In general, the data is described as rich and interesting, and seems to be providing new and useful insights into the covert behavior of classroom participants.

The promising potential of the technique is being recognized gradually. Most classroom investigators who have used this technique, such as Clark and Peterson (1976), Conners (1978a), C. Cooper (1978), Marland (1977) and Nolan (1978), point out that subjects must be willing and able to verbalize thoughts and feelings as accurately and as completely as possible. Stimulated recall methodology is based on the assumption that such reports about these thoughts and feelings are reasonably accurate representations of that behavior.

To date, the use of stimulated recall methodology in classroom research with elementary students has been sparse. Nolan (1978:35) states that "no reported uses of the stimulated recall technique with young children . . . were located by the researcher." This study, therefore, attempted to explore the potential of stimulated recall methodology in research with elementary school students. The same procedures and techniques as outlined by Conners (1978b) were followed as far as was possible given the different age level of the interviewees.

The Observation-Interview Methodology

Normally the observation-interview method consists of three components, namely, an observation of an individual's action or segment of behavior, discussion with the individual and possibly other involved participants about the action or segment of behavior, and an interview with at least the individual concerned. The method is open to the use of participant or non-participant observation or, as used in this study, to the condensing of the components through the use of stimulated recall methodology. For case study research designs the observation-interview method facilitates extensive data gathering of all forms of overt behavior as well as gaining access to individuals' thoughts, feelings, conceptions, social perceptions, and so on.

The observation-interview method has been the subject of some criticism. Criticisms about the cost factor in terms of time and effort, and that the data are difficult to analyze and interpret are problems which researchers using the method tend to accommodate. Of more significance, though, are the criticisms which claim that the data obtained lacks reliability, validity and objectivity. However, as Erlwanger (1974:314) points out, the validity of these criticisms may well depend on the purpose of the interview. The criticisms may be valid for interviews in which the emphasis is to assess the knowledge of subject matter acquired by students in order to arrive at conclusions or generalizations. But where the emphasis is on attempting to study and understand the phenomena underlying students' behavior, and the concern is more on the value of interviews as a means of gaining access to students' ideas rather than with its limitations, then the criticisms of interviews seem to be less valid. Erlwanger's clarification is particularly salient for the use of interviews in this study.

In using the observation-interview method, this study was concerned with the student's ideas underlying his behavior rather than with specific aspects of his behavior. The bases of the interviews were mainly observations made during the lesson and which appeared on the television monitor, points arising from the student's interactive and non-interactive comments, and matters recorded in the field notes.

The interviews were structured and sequenced such that the students perceived the sessions to be concerned largely with the recall of interactive thoughts. Certainly this was the impression conveyed by the interviewer when preparing the students for the interviews. Hence, stimulated recall techniques not only yielded valuable data on student interactive thoughts but served as a trigger for in-depth investigation of students' underlying ideas, beliefs, lines of reasoning, and so on. During the student's recall of thoughts or viewing of the lesson the interviewer was alert for clues. When these appeared, the interviewer would manipulate the interview to probe. Some clues led nowhere. On other occasions, the interviewer missed a great deal because he failed to grasp the significance of some of the students' responses. Care was taken by the interviewer to avoid a systematic approach to probing which could have reflected preconceived intentions. Likewise, suggestions and leading questions were minimized. As Piaget (1960:38) points out, though, suggestive questions do have a place: "Naturally, these last questions, which are suggestive, must be kept to the end, that is to say till the moment when the child cannot be made to say anything of itself." Erlwanger (1974:329) used suggestive questions on occasions "to assess a child's ideas or to confirm a hunch about the child's ideas." In this study, given the intent of the interviews, suggestive and leading questions were sometimes used.

An important component of the observation-interview method is the relationship between the interviewer and the student. A positive rapport in the interview situation reflects a considerable amount of time and effort being expended by the interviewer in a variety of situations with the student prior to the interviews.

In this study the interviewer was conscious of the need to gain student confidence and trust in order to enhance the likelihood of valid data being obtained. The interviewer expected that students would be curious to know what was the purpose of the research, that they would be concerned about anonymity, and so on. At all times fairness and honesty was intended and maintained, with explanations cast in the form of generalities rather than as deceptions. Trust was only ensured when students became aware that the interviewer did not "talk."

However, trust alone was found to be not the only requirement for students to feel free to reveal their own understanding of self-performance. Most students were not accustomed to discussing ideas or expressing points of view about their self-performance. This seemed to be compounded further by the student having to talk in this way with an adult figure. Therefore, the establishing of the personal relationship between the interviewer and the students also concentrated on this unforeseen problem.

Some limitations of the observation-interview method are recognized. Only a small number of students can be adequately observed and interviewed at any one time period. Data is obtained in an informal manner but, most of all, success of the method depends on an adequate relationship being established between the interviewer and students. This relationship, in part, determines the success of the interviews, while other factors include the preparation and perceptiveness of the interviewer. A final limitation pertains to the ethical responsibility of the interviewer. In this study the interviewer had to monitor carefully just how far he could go in probing the private thoughts and feelings of the students.

Validity of the Research Data

A number of major validity issues had to be considered in the gathering of data for this study. Those that pertain directly to the particular research methodologies used in this study have already been discussed. However, other validity issues also presented a problem when designing the study.

This study was investigating aspects of the expectancy effect phenomena in a natural classroom setting. In order to preserve any naturally occurring expectancy effects, it was essential that the teacher and student be unaware that the expectancy effect phenomena were being investigated and that target students were being used. The research strategy, therefore, meant that all students whose parents had consented were interviewed. Data was collected on decoy students but these were much less extensive. Because of time constraints, decoy students were often interviewed in pairs and/or were interviewed for shorter time periods. Target students were interviewed alone until one target student asked when could she be interviewed with a friend. Target students were interviewed each day, whereas most decoy students missed an occasional day. To enhance the screening of use of target students, all possible scrambling strategies were used to avoid the setting of any pattern. The researcher believes that all students and the teacher remained unaware of the use of target students. This is verified by a post-observation open-ended statement completed by the teacher (see Appendix E).

The obtrusive effects on the classroom participants of observations and interviews and videotape recording equipment raise another class of error sources which could invalidate some of the data. Webb, Campbell, Schwartz, and Sechrest (1966:12-21) describe some of the kind of effects which influence people's behavior. The awareness of being tested, the selection of a particular role, the effect of initial observations upon subsequent observations, and the adoption of particular response sets were all considered to prevail in the classroom. A two week period of familiarization was employed in an attempt to reduce these effects. This appeared to diminish the novelty effect of students seeing themselves on a television monitor.

As Webb et al. (1966:21) note, certain interviewer effects also may prevail in an interview. The investigator had little control over these effects other than to attempt to maintain a neutral inquiry role.

A real concern for the interviewer was his position as perceived by the students. For them there existed a potential role conflict between the interviewer as teacher/adult (someone who told them what to do) and the interviewer as researcher. The interviewer sought to harmonize this role conflict. The students varied markedly in the extent to which they were able to discuss ideas and express views to the interviewer. This appeared to depend on what his role happened to be to the students. Those who perceived the interviewer in the teacher/adult role tended to provide more formal responses saying what they thought was required. Students who perceived the interviewer more as a researcher tended to provide more personal responses by relating aspects of their private and personal ideas and views. As the observation phase of the study progressed, more and more students perceived the interviewer in the researcher role.

Phases in the Study

The study proceeded through three phases. The first phase consisted of two pilot study periods which the investigator used to develop adequate technical competency with the equipment, to finalize decisions regarding the research design and procedures and use of instruments, and to provide experience with interviewing techniques. The second phase was the period of familiarization in which the investigator completed a number of pre-observation tasks. The third phase was the period of observation in which data was collected.

Pilot Studies

Two pilot studies, each of one week's duration, were undertaken in April 1978 and June 1978 at a different school to that used in the research. They were undertaken to fulfill five main functions:

1. The research was based on one particularly salient assumption, namely, that students enter and participate in a learning situation with thoughts and feelings about their self-performance. A primary function of the pilot studies was to verify whether this assumption could be justified.

2. The projected research design consisted of pre-lesson interviews as well as extended post-lesson interviews. This and other features of the design were to be checked for practical viability.
3. The use of videotape recording equipment in a classroom necessitated some field experimentation and testing in order to gain the best possible visual and audio recordings.
4. The researcher had no previous experience at interviewing students for research purposes. The interviewer tried a number of different strategies in order to evaluate his technique in terms of the quality and quantity of data elicited.
5. The researcher was interested in determining from which grade level of student the most relevant and comprehensive data might be obtained. For this reason, the pilot studies involved both Grade 4 and Grade 6 level students and their teachers. One Grade 6 class and two Grade 4 classes comprized the sample. The subject area for the lessons was mathematics.

Results of the pilot studies. Analysis of the audiotape recordings of the interviews justified the assumption upon which the study was based, namely, students do enter and participate in a learning situation with thoughts and feelings about their self-performance. Effort and task difficulty attributions were cited mainly as explanations for success or failure. Also, achievement-related behavior was very much under the influence of peer effects.

The research design and procedures were found to be workable. Stimulated recall methodology was judged to be a useful research tool with students of elementary school level. Doubts had arisen, however, about the effectiveness of pre-lesson interviews. These were intended originally to provide data on target students' thoughts and feelings pertaining to self-performance about the forthcoming lesson, but the data appeared to become repetitious after successive days. The decision whether or not to retain pre-lesson interviews was held over till the familiarization phase.

The pilot studies raised the very real need to adopt some strategies which would screen the use of target students in the study. However, such strategies were expected to be costly in terms of timing.

From the pilot studies the researcher gained valuable experience in using the videotape recording equipment. Audio problems were overcome sufficiently to ensure effective recordings.

The researcher gained essential experience with interviewing. Later evaluation by the researcher and another graduate student enabled feedback on interviewer style, especially with questioning techniques. In terms of the most effective interviewing strategy, the pilot studies indicated that an integration of stimulated recall methodology to elicit interactive thoughts with probing questions to obtain self-performance thoughts and feelings yielded the more relevant data.

The teacher and the students were all able to recall interactive thoughts, suggesting that the procedures and the role definitions for interviewer and interviewees, as summarized in Appendix B, were functional and sufficient. Some students were less verbal than others. While this may reflect inadequate establishing of rapport by the interviewer, it alerted attention to the need to select students who were able and willing to verbalize thoughts and feelings.

The pilot studies indicated that Grade 6 students were better able to express thoughts and feelings about self-performance once good rapport was established. Maybe self-performance is of greater concern to these students. Most certainly they seemed more conscious of peer influences and this factor seemed to affect greatly their achievement-related behavior in the classroom.

Familiarization Phase

For two weeks immediately prior to the data gathering and observation phase a variety of familiarization and pre-observation procedures were undertaken in the classroom.

1. The researcher introduced himself as a visitor to the classroom a few days before the two week familiarization period. The importance of the initial contact with the teacher and the students was fully recognized. The teacher volunteer had consented to participate before the study was introduced to the students. The researcher spoke to the students in terms of being interested in what students and the teacher thought as well as what they did during the teaching/learning process. The use of videotape recordings and interviews was explained prior to distribution of parent consent forms.

2. The researcher familiarized himself with classroom routines, schedules, resources.
3. The researcher familiarized himself with the students in terms of memorizing names, noticing characteristics, and identifying potential target student candidates.
4. The researcher introduced the class to videotape recordings, both with the actual recording process and with the playback. The teacher and students viewed themselves on videotape during mathematics lessons on three occasions before interview rehearsals using stimulated recall methodology were introduced. The awareness of being observed effects were prominent during the first two or three days but the distraction of "being on T.V." diminished progressively following this initial phase. Technical concerns with the videotape recordings were overcome at this time as well.
5. The researcher orientated the teacher and the students to the interview situation. Outlining the roles of the teacher and students in the interview setting was deemed essential for yielding effective data.
6. The researcher administered the IAR and the PAPS scales, and consulted the students' cumulative records to obtain data to aid in the selection of target students.
7. The researcher conducted initial pre-observation interviews with the teacher and with the students for the purpose of obtaining data which would contribute to the process of selecting target students.
8. The researcher rehearsed the research procedure on three

consecutive occasions. These rehearsals involved recording the mathematics lessons on videotape and conducting the post-lesson interviews with all students. A number of final decisions were made during these rehearsals. First, the target students were finally selected. Second, the pre-lesson interviews with the target students were dropped from the research design because of timing difficulties and because elements of these interviews were accommodated within the post-lesson interviews. Third, the use of screening strategies involving all students were found to be viable and they were retained.

9. The researcher developed the vital personal relationship with the teacher and students. This relationship seemed to underlie the effectiveness of the entire study. The researcher spent considerable time interacting and talking with the teacher and students in a variety of situations and venues.

In the judgement of the researcher, classroom life was less affected by the obtrusion of the research after two weeks of familiarization. The videotape recording equipment still attracted some attention but the distractions were short-lived. The researcher generally felt accepted as a person in the classroom group.

Data Collection Phase

The process data were collected by the researcher over a two week period in early November, 1978. The research design consisted of observing and collecting data during 10 consecutive mathematics lessons. These mathematics lessons occurred in the first hour of the school day, leaving the balance of the day for previewing the videotapes and interviewing.

The research procedures involved with videotape recording, previewing the videotapes, and interviewing are detailed in the following sections.

Videotape recording of the lessons. The entire mathematics lesson on each day was recorded on videotape. One Sony Videocamera CVC 2100A and a half-inch reel-to-reel Javelin Videotape Recorder VTR 2000 were used for recording the lesson. The picture being recorded was viewed on a Sony 110 Television Monitor. Two microphones were used to record sound. A multi-directional Sony ECM 150 Microphone was placed above the blackboard and a Lectrosonics Wireless Microphone M30R/R31 was worn by the teacher. The sound from these microphones was directed into a Shure audio mixer and then recorded on videotape. The researcher, who operated all the recording alone, monitored the incoming sound through the use of a set of Sharpe H.A.10 Mark II Headphones. The audio mixer allowed the researcher to localize the recording of classroom interactions when desired.

For best visual effects for the purposes of this study, the recording camera was located near the front and away to one side of the room. By regularly panning the camera within a 45 degree arc the front or side profiles of the teacher and all the students were recorded.

While recording the lessons the researcher took care to avoid selective concentration of the recorded picture and/or sound on the target students, hence no zooming for close-ups was used. A regular panning of the camera across the class in general was maintained to facilitate later coding of student overt behavior. Brief pauses in the panning only occurred when a dyadic interaction between the teacher and any student was being sustained.

During the recording, a lesson overview was prepared by the researcher. This described the sequence of happenings throughout the lesson. Progressions of teaching ideas, changes in lesson activities, significant or intriguing questions or comments from either the teacher or student, and every dyadic public or private interaction between the teacher and the student concerned were recorded against a VTR counter reading and also the time on the clock (see Appendix F for example of part of a lesson overview). Potential stimulus points for the later stimulated recall interviews, as perceived by the researcher during the lesson, were also indicated.

Previewing the videotapes. Immediately following the mathematics lesson the researcher previewed the videotape recording in the interview room, formerly a storeroom in the main school building. The preview facilitated the confirmation of appropriate features in the lesson which would serve as useful stimulus points in stimulated recall discussions. These features had been first noted on the lesson overview--the lesson description completed by the researcher during the recording of the lesson. In addition, ideas to be discussed and questions to be raised with the teacher and the students were often determined while previewing the videotapes. The researcher was able to preview the videotapes in the period before morning recess.

The interviews. Most of the interviews with the students consisted of their reporting interactive thoughts through use of stimulated recall. Integrated with these reports were the interviewer manipulated segments of the interview which probed for self-performance data. The interviews with the teacher only employed stimulated recall methodology.

The target students were, with one exception, interviewed individually, were interviewed daily, and were never interviewed in the same order from one day to the next. The decoy students were interviewed either individually or in pairs, and this varied for each student on a day by day basis. Due to timing difficulties, it was not possible to interview each decoy student every day. However, as Table 2 indicates, with an average daily interview rate of 10 decoy students, a reasonable coverage was achieved. A random order of interviewing also was maintained with the decoy students.

Generally, the first students to be interviewed in any one day were decoy students. The researcher often used these initial interviews to clear up any doubts or misconceptions regarding the content or progression of the lesson. As well, if a particular self-performance notion had come to his mind the researcher would often explore the relevancy and meaningfulness of that notion with decoy students. At another level the researcher would seek to refine his questioning technique, such as practising the wording or phrasing, and observing the style most readily understood by the student.

The order of a typical day's interviewing would likely consist of the following:

1. The first two interviews, with decoy students, would occur

Table 2

Distribution of Grouping Modes Used When Interviewing
Target Students and Decoy Students During
the Data Collection Phase

Grouping Mode	Lessons									
	1	2	3	4	5	6	7	8	9	10
Target students--individual	4	4	4	4	4	3	4	4	4	4
Target students--pairs	-	-	-	-	-	1	-	-	-	-
Decoy students--individual	4	3	6	1	-	-	1	16	4	17
Decoy students--pairs	8	8	4	6	8	7	8	-	-	-
Total students interviewed	16	15	14	11	12	11	13	20	8	21

Mean number of students interviewed per lesson = 14.1

immediately following morning recess. Normally, a target student was also interviewed before lunch.

2. During the lunch hour, either the teacher was interviewed or, when this was not possible, decoy students who were available and willing were interviewed.
3. Throughout the afternoon an intermingling of decoy and target students would be interviewed.
4. After school, the teacher was interviewed on those occasions when she had not been available for a lunch hour interview.

A student or pair of students would be withdrawn from regular class either by the researcher or the preceding interviewee(s). The role definitions for the interviewee (as outlined in Appendix B) were repeated on most occasions, though this seemed unnecessary after the initial interviewing periods. The interviewer controlled the VTR, but selection of stimulus points was also available to the student interviewees. On numerous occasions they selected points on the recording for reporting interactive thoughts. The interviews with target students often commenced and/or concluded with an inquiry into self-performance thoughts and feelings relative to the lesson of the day or the forthcoming lesson on the next day. These inquiries were similar in direction and intention to the former pre-lesson interviews which were dropped as a data gathering source.

The stimulated recall interviews with the teacher, in many respects, were similar in procedures to those undertaken with the students. The interviewer was less verbally active during interviews with the teacher. As well, she was able to nominate more stimulus points than the interviewer for reporting interactive thoughts.

The ninth lesson of the ten lessons which comprized the data collection period was given over to an end-of-unit test. This was perceived by the researcher to be a critical opportunity to gather student self-performance data in a particularly sensitive achievement-related situation. As a consequence, pre-test and post-test interview schedules (as presented in Appendix C) were developed. These were based on the format and structure of the former pre-lesson interview schedules which were trialled and modified during the pilot study. The pre-test interview was conducted with every student on the day before the test. Likewise, the post-test interview was conducted with every student on the day after the test--the day the students received the results of the test. For the target students the pre-test and post-test interviews were conducted in conjunction with the regular interviews. The decoy students' pre-test and post-test interviews were conducted on an individual basis with no accompanying stimulated recall interview because of timing difficulties.

All interviews with the teacher and with the students were audiotaped on a Sony Cassette Tape-recorder, Model TC-110B.

Classroom overt behaviors. Student overt behavior data and teacher-student dyadic interaction data were obtained from the video recordings after the data collection phase. The researcher developed a coding system for recording student overt behavior data from observation of students' behaviors. The coding system is described in Chapter IV. Student overt behaviors were recorded once every minute on a time sample basis.

The teacher-student dyadic interactions were also coded from the video recordings using a low inference system based on the Expanded Brophy-Good Teacher-Pupil Dyadic Interaction Classroom Observation System (Brophy and Evertson, 1973).

Summary

This study was designed to examine some of the phenomena underlying the expectancy effect in a regular functioning classroom. Ten consecutive mathematics lessons were videotaped in a Grade 6 classroom for use with follow-up stimulated recall interviews. Four target students reported their interactive thoughts and described their thoughts and feelings pertaining to self-performance in mathematics. The teacher also reported her interactive thoughts. The videotape recordings of the lessons also facilitated later observation and analysis of teacher and student overt behavior. Such a research design was intended to yield data which provided insights into the attributional behavior of classroom participants. These insights may well contribute to an explanation of the teacher expectancy phenomena.

Chapter IV

DATA ANALYSIS

Overview

Two main sets of data were gathered in this study: 1) student behavior data; and 2) teacher-student dyadic interaction process data. For the purposes of data gathering and analyses of that data, student behavior while learning mathematics in the regular classroom was divided into overt and covert aspects. The teacher-student dyadic interaction process data also incorporated both overt and covert aspects.

This chapter outlines the development of category systems for analyzing student behavior data. Student overt behavior and students' interactive thoughts and feelings were categorized and quantified to provide a description of student process behavior. Other student covert behavior, such as non-interactive thoughts about the lesson situations and causal explanations of behavior, were analyzed by qualitative means.

Teacher-student dyadic interaction process data at an observable level were coded using a low inference observation system, while teacher interactive thoughts pertaining to students and students' performances were submitted to a qualitative analysis.

The two sets of data, when analyzed, were used to conduct a summary qualitative analysis which provided information about the phenomena underlying the expectancy effect.

Analysis of Student Overt Behavior

A category system for analyzing student overt behavior during classroom learning was developed by inductive means. The students' behavior during 10 mathematics lessons was recorded on videotape and the examination of these videotapes by the researcher led to the building of the category system.

The Development of the Category System

The initial examination of the videotapes indicated that a time sample of recording student overt behavior was the most feasible. In order to pick up all students' and the teacher's behaviors in a systematic manner, the researcher found it necessary to pan the classroom regularly when operating the videocamera. A time sample of one minute intervals was judged to be practical and to be efficient in reflecting specific behaviors and behavior changes.

The development of the category system stemmed from observation of the target students' behaviors. At one level students appeared to be either on-task or off-task. On-task behaviors were defined as those which appeared to indicate that the student was concentrating on the progression of the lesson, on the learning task required of the students, and/or on the subject matter directly under consideration by the teacher and students. Generally the student would be observed to be attending or listening. On some occasions the student might have his head on the desk, be fidgeting, or doing work in relation to the task but, so long as the researcher was able to judge that the student was mainly attending or listening, he was categorized as being on-task.

Off-task behaviors seemed to take a number of forms of self-involved distractions. These behaviors included just staring aside as if daydreaming, watching others, fidgeting in or on his desk, doing work not related to the task before the class, and head on desk. Where the researcher judged the student's intention to be off-task then the behavior was categorized accordingly.

At times students interacted with other students or were out of their desks. Because it was difficult to always assess which of these were on-task or which were off-task, the researcher categorized these behaviors separately. Some of the students' interactions with other students seemed work-related while others seemed non-work-related. Other interactions seemed to involve annoying or deliberately distracting elements. Students were out of their desks for a number of reasons. Some of these included approaching the teacher, moving to be with other students, just moving around the classroom for no apparent purpose, being absent from the room, or moving to procure materials.

A category of behavior judged to be on-task, yet treated separately from the attending-listening category, was those occasions when the student was being supervised by the teacher either at the student's desk or elsewhere in the room. This supervision consisted of either the teacher merely observing the student's work or interacting verbally with the student. Such instances of behavior always occurred during seatwork. Being supervised was treated separately because the behavior involved a dyadic interaction and was considered to provide support data to the low inference observation system which was used to code classroom dyadic interactions.

Three broad categories of lesson situations were observed to occur during the mathematics lesson:

1. Teacher-led whole class instruction.
2. Student demonstration, whole class instruction.
3. Seatwork.

Teacher-led whole class instruction consisted of teacher exposition or lecture, teacher controlled discussion, and teacher demonstration using the blackboard, overhead projector or other apparatus and equipment. Student demonstration in a whole class instruction situation referred to those occasions when the teacher called upon a student to demonstrate an idea, reinforce a teaching point, or attempt a discovery of an idea, either at the blackboard, with the apparatus, or using the overhead projector. Seatwork included those activities in which the students were assigned to work independently on worksheets, practice with apparatus, and so on.

The categories of student overt behavior in relation to the categories of lesson situations are summarized as a two-dimensional framework in Figure 5.

Categories of Lesson Situations	Categories of Student Overt Behavior				
	On-Task	Off-Task	Interaction with Students	Out of Desk	Supervised
Teacher-led whole class instruction					
Student demonstration, whole class instruction					
Seatwork					

Figure 5. Framework for Recording Categories of Student Overt Behavior in Relation to Categories of Lesson Situations.

Procedures for Coding Student Overt Behavior

From viewing the video recordings of the 10 mathematics lessons, the researcher was able to observe and record the overt behavior of all four target students in this study at the same time. At minute intervals (accurate to the nearest 5 seconds) each target student's behavior was coded by the researcher onto the framework of categories of student overt behavior in relation to categories of lesson situations presented in Figure 5. Coding was sustained throughout the lesson except for transition periods at the beginning of the lesson, during the lesson, and at the end of the lesson.

Following coding, the data for each target student was analyzed on a lesson by lesson basis and percentage distributions derived.

Reliability

Reliability coefficients for intercoder and intracoder reliability of coding from the videotapes were calculated. A student in a doctoral program in the Department of Educational Administration at the University of Alberta acted as coder. He experienced a two-hour training period during which the categories of the system were discussed and the coding process practised. A sample of two lessons was coded completely in the reliability check. Intracoder reliability was undertaken two months later with another sample of two lessons.

Because the researcher anticipated a high frequency of coded decisions would be obtained for one of the categories--on-task behaviors--consideration, in terms of a reliability estimate, was given to what Johnson and Bolstad (1973:13) refer to as the base-rate problem, "that is, the obtained percent agreement figure should be compared with the amount of agreement that could be obtained by chance." Scott's formula, as described by Holsti (1969:140), adjusts for the occurrence of chance and, therefore, was used in this study to calculate the reliability coefficient. Scott's formula is:

$$R = \frac{Po - Pe}{1 - Pe}$$

where Po represents the percentage observed agreement between coders, and Pe the percentage of expected agreement by chance.

Scott's formula is considered to provide a stringent estimate of reliability, yet because the complexity of the category system used to analyze student overt behavior was considered not great, 0.8 was established as an acceptable level of reliability. Table 3 contains a summary of the results of the reliability checks. Reasonable measures of reliability in stability of researcher coding and in the category system were obtained.

Content Analysis System of Student Interactive Thoughts

A category system for analyzing student process covert behavior, that is, the student's interactive thoughts and feelings during the classroom learning of mathematics, was also developed by inductive means. The Content Analysis System of Student Interactive Thoughts (CASSIT) was developed in accordance with the principles and

Table 3

Intercoder and Intracoder Measures of Reliability in the Use of the Category System for Analyzing Student Overt Behavior

	Sample Coded	Coefficient of Reliability
Intercoder reliability	2 lessons (No. 4 and No. 8)	0.78
Intracoder reliability	2 lessons (No. 3 and No. 6)	0.87

requirements for developing a content analysis system provided by Holsti (1968).

Holsti (1969:14) described content analysis as a technique used "for making inferences by systematically and objectively identifying specified characteristics of messages." Objectivity refers to the need for precise descriptions of categories, while the systematic component of content analysis ensures the application of clear guidelines. Such notions stress non-ambiguity. The third element of Holsti's description emphasizes generality--findings must have theoretical relevance.

The process of coding is used to approach data such as contained in transcripts of interviews. The data, in Holsti's (1968:644) terms, "are systematically transformed and aggregated into units which permit precise description of relevant content characteristics." This is achieved by two fundamental coding steps. First, the data source is segmented into units which are meaningful to the research problem. Second, the units are placed into one of several discrete, clearly defined categories; the categories being relevant to the researcher's theories.

The Development of the Category System

The inductive development of CASSIT involved repeated examinations of the transcripts containing the data before being finalized. The phases of development were:

1. The differentiation of interactive phenomena from non-interactive phenomena. As well as students' interactive thoughts and feelings, the transcripts contained such

non-interactive verbal reports as causal explanations of behavior, preactive thoughts, post-active thoughts, and descriptions of what they were doing.

2. The establishment of the unit of analysis to be used. For this study, similar to that adopted by Conners (1978a) and Marland (1977), a single thought or idea embodied in a single word, a part of a sentence, or an entire paragraph was chosen as the unit of analysis.
3. The classification of the many different units of interactive thoughts and feelings into distinguishable groups. Each group consisted of a set of thought units which shared one or more distinct characteristics. These groups were the categories of student interactive thoughts and feelings. They were, therefore, mutually exclusive, were exhaustive in that all data were classifiable, and they reflected the purposes of the research.

A full description of CASSIT is presented in Appendix G. In brief, the main components of the system include a set of nine guidelines for distinguishing between interactive and non-interactive data, a unit of analysis as being based on a single thought or idea, and nine categories of units of interactive thoughts. A brief description of these categories is as follows:

Subject Matter: Units in which a student's thoughts are focused specifically on the content and skills of mathematics.

Cognitive Processes: Units in which a student reports a thought process involved in learning the subject matter.

Behavioral Moves--Self: Units in which the student reports his thoughts about an action he was performing, had performed, or was considering performing in relation to the learning process. Such an action must reflect a personality orientation.

Behavioral Moves--Student: Units in which the student reports his thoughts and feelings about an action involving other students.

Behavioral Moves--Teacher: A unit in which the student reports his thoughts and feelings about an action involving the teacher.

Self-Performance--Thoughts: Units in which the student is thinking about his or her performance behavior and outcomes. The essential element of these work-related units is self.

Self-Performance--Feelings: Units in which the student reports an emotion pertaining to his or her performance behavior and outcomes.

Feelings: Units in which the student reports an emotion experienced during a lesson which is not associated with self-performance.

Non-Task-Related: Units of thought which do not pertain to the learning of the subject matter.

Given the purpose of this study in student classroom behavior in general, and self-performance thoughts and feelings in particular, the thought units in six of the categories of the content analysis system, namely, behavioral moves--self, behavioral moves--student, behavioral moves--teacher, self-performance--thoughts, self-performance--feelings, and feelings, were analyzed further. Subcategories within each of these categories were clearly defined and established.

Reliability

With most content analysis systems concern with reliability is usually directed at the coding processes of unitizing and of categorizing. The CASSIT used in this study introduced an additional reliability concern. The coding process which is used to distinguish interactive data from non-interactive data should also be subjected to a reliability check. Conners (1978a:107) notes that reliability checks should be undertaken with all three coding steps and he used three different coefficients of reliability accordingly. The researcher employed the same procedures of establishing reliability for the coding processes in this study.

To establish reliability coefficients for the coding of data into interactive and non-interactive categories, which Holsti (1969:138) refers to as dichotomous decisions, the ratio of coding agreements to the total number of coding decisions was used:

$$\text{C.R.} = \frac{2M}{N_1 + N_2}$$

Holsti (1969:140) explains that, "in this formula M is the number of coding decisions on which the two judges are in agreement, and N_1 and N_2 refer to the number of coding decisions made by judges 1 and 2 respectively."

Reliability coefficients for the coding process of unitizing reflect the consistency with which coders segment the data into a similar number of units. Conners (1978a:107) cites Guetzkow's contention that unitizing reliability can be established by "expressing the difference between two coders as a percentage of the sum of the number of units obtained by each coder."

$$U = \frac{O_1 - O_2}{O_1 + O_2}$$

In this formula O_1 is the number of units established by the first coder and O_2 is the number of units established by the second coder. For this formula, a ratio of zero indicates perfect agreement between coders.

To establish reliability coefficients for the coding process of categorization, use was again made of Scott's formula. Holsti (1969:140) reports that this formula takes into account "the extent of intercoder agreement which may result from chance." Hence, the formula corrects for the number of categories in the content analysis system and for the probable frequency with which each is used.

Scott's formula is:

$$\text{Reliability} = \frac{Po - Pe}{1.00 - Pe}$$

In this formula, Po represents the agreement between two observers and Pe represents the agreement between two observers which occurs by chance.

Reliability checks. Both intracoder and intercoder reliability checks were undertaken. Intracoder reliability, an index of stability of the researcher's coding, was calculated on two separate occasions, two months apart, using a sample of 15 segments from the stimulated recall transcripts of all four target students on each occasion. Intercoder reliability, an index of system reliability, was determined using the same sample of 15 segments as with intracoder reliability. A student in a doctoral program in Educational Administration at the University of Alberta acted as a coder. Training of four hours was undertaken and consisted of discussion of all elements of CASSIT and practice in coding.

According to Holsti (1969:142), "defining an acceptable level of reliability is one of the many problems in content analysis for which there is no single solution." He suggests, therefore, that in content analysis research the determination of an acceptable level of reliability needs to be determined in relation to the complexity of the content analysis system used and the significance of the research problem involved.

Marland (1977:85) established a reliability coefficient of 0.70 as an acceptable level of reliability. Given the complexity of the content analysis system used, and that Scott's formula was described by Holsti (1969:141) as one "which produces a conservative estimate of reliability," a reliability coefficient of 0.70 was considered to be an acceptable level of reliability for this study.

The results of the reliability checks are presented in Table 4. Both intracoder and intercoder reliability coefficients for the categorization process of coding were greater than the 0.70 set for acceptable reliability, that is, the most significant reliability check of the three used for the content analysis system. This indicated that CASSIT seemed to be a reliable instrument.

Table 4

Intercoder and Intracoder Measures of Reliability
in the Use of CASSIT

	Coefficient of Reliability
Intercoder Reliability	
Interactive versus non-interactive data	0.73
Unitization	0.12
Categorization	0.79
Intracoder Reliability	
Interactive versus non-interactive data	0.86
Unitization	0.02
Categorization	0.89

The indices of reliability for the coding processes of distinguishing interactive from non-interactive data and of unitization are also acceptable. Intercoder reliability estimates are close to the pre-established levels of adequacy. Maybe more training time to enhance proficiency in these coding processes would have resulted in higher reliability being achieved. Examination of the coding decisions of the coder who undertook the reliability check indicated a practice effect occurring in the initial segments of data. The slightly depressed results do emphasize the need to conduct reliability checks for these processes, for error and lack of consistency with one of the coding processes must compound the reliability of the other coding processes.

Measures of intracoder reliability were acceptable and suggested researcher stability in coding the data over at least the short term of two months.

Attributional Analyses of Student Covert Behavior Data

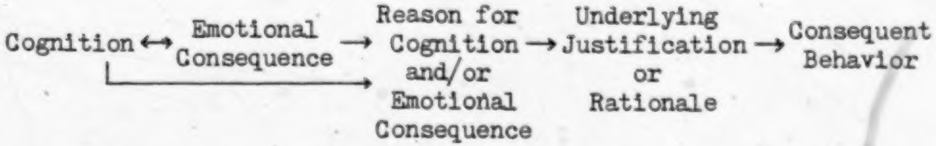
The transcripts of the post-lesson interviews contained more student covert behavior than the student interactive thoughts derived from stimulated recall. Among the non-interactive data were an array of ideas, views, beliefs, emotions, and lines of reasoning which served to explain student interactive thoughts and feelings and student overt behavior. Some of the data were elicited incidentally in association with student reports of interactive thoughts. Other data were obtained in a more direct manner from structured questioning, such as in the pre-test and post-test interviews. Much of these data pertained to student self-performance. Analyses of these data were undertaken for each target student in order to describe each student's conceptions of self-performance.

The analyses of the data pertaining to student self-performance sought to identify two sets of phenomena, namely: 1) the causal explanations of a student's expression of thoughts and feelings about self in the learning situation; and 2) the characteristics of a student's underlying ideas, views, beliefs, emotions, and lines of reasoning, that is, the base which seems to influence the causal derivations of behavior.

The distinction between the two sets of phenomena may be purely arbitrary. However, the researcher approached the phenomena in this exploratory study as if they consisted of some dynamic process aspects and more enduring aspects. Each of the aspects were considered from an attributional perspective.

Causal Explanations of Behavior

A framework for analyzing the data to obtain causal explanations of behavior was developed by inductive means. The researcher examined all transcripts and noted patterns of statements which seemed to be related contextually. Where an interactive thought or feeling which contained a cue about self-performance had been expressed by the student, the interviewer had often pursued the point by using probing questions to elicit further information about the student's mental life. This questioning tactic tended to result in a chain of student comments, usually linked in the following pattern:


Cognition
Emotional Consequence
Reason for Cognition and/or Emotional Consequence
Underlying Justification or Rationale
Consequent Behavior

The student's report of an initial cognition with or without an emotional consequence often referred to an aspect of self-performance. Sometimes the student had included a reason for his behavior but more often the interviewer had elicited the reason by asking such questions as: Why did you think that?

Why did you do that?

How come that you . . . ?

The reason provided by the student tended to be related directly to the initial cognition, so usually the interviewer probed further with such questions as: Why do you think (the reason given) made you think or do (the initial cognition or emotion)? Student responses to these questions tended to disclose belief systems, lines of reasoning, and points of view underlying a student's thoughts and feelings about his self-performance.

The following examples of chains of student comments include the emotional consequence linkage.

When I got back my test paper → I was so happy → I had worked hard on the worksheets and always listened → It's going to show on my report card → I hardly heard anything she said when she went through the test. (Tina)

When I need help → I'm scared to ask the teacher → She might think I was dumb → I worry about what the teacher thinks of me → I ask another kid instead. (Lisa)

Other chains of student comments do not contain an emotional consequence linkage.

I don't understand it → I know I only got it right through guesswork → If I don't understand something I'm not afraid to ask → Will check with the teacher as to how it is really done after school. (Tina)

Not all chains of student comments included the consequent behavior linkage. Consequent behaviors tended to become the initiating behavior for another chain of student comment.

After collating chains of student comments which more or less matched the evolved framework or pattern, the researcher then placed into clusters those chains which contained, referred to, or reflected common initial cognitions, perceptions, and/or motives of behavior. From these clusters, evidence of consistencies in the causal explanations or causal perceptions of a student's behavior were discerned. As a consequence, a dynamic view of a student's covert behavior pertaining to self-performance in the learning situation began to emerge.

The Underlying Covert Behavior of Students

In the process of examining the data for causal explanations of behavior, the researcher became aware of numerous student thoughts which seemed to represent the very base from which originated all other thought and action pertaining to self-performance. When these generic-like ideas, beliefs, views, emotions, and lines of reasoning were identified and recorded for each student, a composite array of phenomena were revealed which contributed greatly to the description of a student's conception of self-performance.

Some of these student ideas and beliefs had developed into a kind of implicit theory about successful achievement as indicated in the following example:

> T: He and I are about the same. We are pretty good at math.
> I: Why do you think you're pretty good at math?
> T: Well, I think I try harder and I get my homework done all the time. You know, if you just use your brains you can do something you want. Some of them, they...you know, you can tell, like they are smart kids but they just don't use their brains.
> I: What about other kids you think are not smart?
> T: Well they are smart. Like, you know, just not as good as some others. Because they don't try, they don't like the subject, they don't bother trying. And since they don't get things right they hate it even more, you know. (Tina)

Other underlying thoughts of students reflected a single basic idea, belief, or point of view, as in the following examples:

> Mike: Kids who do well should be recognized in front of the class.
>
> Lisa: The teacher will remember even the smallest things months later.
>
> Greg: I prefer half the worksheet to be easy and half of it to be hard, because the easy work helps you to understand, and so lets you try better on the hard work which makes you think more.
>
> Tina: Boys do better in maths because girls like more the language arts.

Descriptions of the phenomena of underlying student covert behavior yielded a number of insights into student causal perceptions of success and failure, of task structure and difficulty, of other students' performances, and of the teacher's performance expectations for them. The phenomena seemed to influence greatly the causal explanations and perceptions students expressed in relation to their behavior. While the phenomena of students' underlying thoughts were not static forms of covert behavior in the strict sense, they seemed to be reasonably stable during the period of observation for this study.

The Characterization of Student Conception of Self-Performance

The attributional analyses of student covert behavior pertaining to self-performance has involved a descriptive approach. Commonalities among the chains of thoughts and among the underlying base of ideas, views, beliefs, emotions, and lines of reasoning have been derived inductively from examination of the transcripts of the target students' verbal reports. From a description of these interrelated commonalities the researcher has been able to infer and "piece together" some of the more significant characteristics of each student's conception of self-performance during the learning of mathematics.

Analysis of Dyadic Interaction Data

A major purpose for building up a characterization of a student's conception of self-performance was to attempt an explanation of the expectancy effect. The expectancy effect is thought to involve mainly process elements or variables, especially those pertaining to teacher-student interactions. Data from different sources were gathered on the dyadic interactions between the teacher and each of the target students. The main data sources were:

1. video recordings of the lesson from which overt behavior of

the interaction participants was coded by use of the low inference classroom observation system;

2. transcripts of post-lesson interviews using stimulated recall methodology with the teacher which contained verbal reports of teacher interactive thoughts on some of the interactions; and
3. findings about student behavior and student conceptions of self-performance which had been analyzed previously.

The method of analysis used for these various data was based on the suggestion by Webb, Campbell, Schwartz, and Sechrest (1966:174) about the triangulation of different data as a means of validating evidence. The inter-relationships of the different sources of data for an interaction episode are illustrated in Figure 6. This method of analysis involved an examination of all the data collected, that is, the interview data and the observational data.

Interview Data

Students. The students' covert behavior data, as obtained from interview situations, were already analyzed, resulting in the characterization of students' conceptions of self-performance.

Teacher. The teacher's verbal reports of her thoughts and feelings during the observation lessons, as derived from the use of stimulated recall methodology, were recorded and transcripts were prepared. These transcripts were examined and sections of interactive and non-interactive thoughts relative to the target students, and especially the teacher-student dyadic interactions, were extracted and

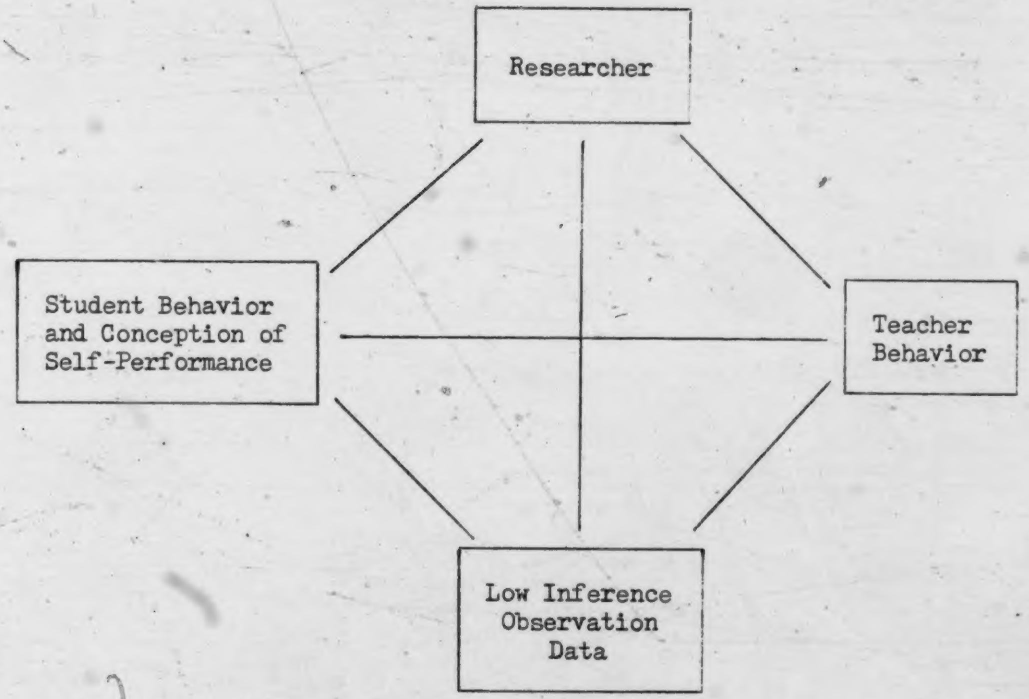

Researcher
Student Behavior and Conception of Self-Performance
Teacher Behavior
Low Inference Observation Data

Figure 6. Representation of the Interrelationships Among and Between Different Sources of Data for an Interaction Episode

analyzed. These thoughts tended to consist of causal perceptions of a student's performance, performance expectations for that student, thoughts about the student's mental processes in learning and understanding, feelings about the student, and perceptions and interpretations about student behavior in general.

The Observation Data

Dyadic interaction data were coded through use of the low inference classroom observation system. The system yields both quantitative and qualitative data. Frequency of interaction between the teacher and each target student, frequency of student-initiated as against teacher-initiated contact, and frequency of private interactions as against public interactions provided data of a quantitative nature. Patterns of use of various teacher reactions or feedback to student responses to questions, or to student initiated contacts, enabled some qualitative data of teacher behavior in the interactions to be obtained.

The video recordings of the mathematics lessons provided the data source for coding the dyadic interactions. Coding was conducted in accordance with the procedure outlined in Brophy and Good's (1969) manual for coding classroom behavior.

Intracoder and intercoder reliability checks were undertaken. Reliability was calculated using a formula proposed by Brophy and Evertson (1973). The formula is: Percentage agreement = number of coding decisions made by both coders and agreed upon, divided by itself plus the number of coding decisions not agreed upon plus the number of codings made by the first coder but not the second plus the number of codings made by the second coder but not the first.

An 80 percent agreement criterion was set as an adequate measure of reliability for both intracoder and intercoder checks. A student in a doctoral program in the Department of Educational Administration at the University of Alberta acted as a coder. This student had previously used the low inference observation system. After two hours of retraining, which involved discussion of the observation system and practice at coding from the video recording, he was able to code the interactions between the teacher and each of the four target students during two complete lessons. An intracoder reliability check was conducted two months after the original coding. In each case the measure of reliability was within the agreement criterion of 80 percent which had been recommended by Brophy and Evertson (1973). Table 5 presents a summary of the measures of reliability.

All the data pertaining to the dyadic interaction episodes between the teacher and each of the target students were carefully examined. Selections were made from all these data sources to provide overall descriptions of the episodes.

The Summary Analysis

Student overt and covert behavior data, the characterization of student conceptions of self-performance, and the dyadic interaction data provided a detailed descriptive base upon which to explore the expectancy effect phenomena. The information base was examined for the presence of any relationships among and between student

Table 5

Intercoder and Intracoder Measures of Reliability in the Use of the Low Inference Classroom Observation System

	Coefficient of Reliability
Intercoder Reliability	
Lesson 1	79.26
Lesson 2	83.37
Intracoder Reliability	
Student 1	82.61
Student 2	88.30
Student 3	90.18
Student 4	84.65

conceptions of self-performance, student causal perceptions of success and failure, student achievement-related behavior, teacher behavior towards the student, and teacher's causal perceptions of student performance. The finding of any suggested relationships was considered to contribute toward an explanation of the expectancy effect as it existed with the teacher and each of the four students in the learning of mathematics in a regular functioning Grade 6 classroom.

Chapter V

CASE STUDIES : TINA AND MIKE

Organization of the Case Studies

The case studies of the four Grade 6 students illustrate how typical students in a classroom perceive and behave in achievement-related situations, in this case the learning of mathematics. Each case study consists of a unique and idiosyncratic description of a person and his/her behavior, suggesting a considerable diversity in how individual students view the complexity of the same learning setting.

An analysis of these descriptions, however, proceeds on an individual basis in order to develop as complete as possible a profile of each student's behavior and conception of self-performance. Each case study is described in a way that best describes the student's conceptions. An attempt is made to illustrate how the student's conception appears to function as a relatively stable cohesive system that controls and directs his thinking in the learning of mathematics.

Chapter V contains the case studies of two "successful" students--Tina and Mike. These are the students who were classified as high achievement, high motivation students. Chapter VI contains the case studies of two "less successful" students--Lisa and Greg--who were classified as low achievement, low motivation students.

The profiles are presented in the following way:

1. A short selective biography of the student is presented. The sketch focuses on school-related aspects and is based upon information gathered from interviews with the teacher and the student and from objective sources such as the two scales relating to student self-expectations of performance and school cumulative records.
2. A quantitative analysis of the student's overt and covert behavior during the learning of mathematics is presented and discussed.
3. The causal perceptions and explanations of student behavior, as reported by the student, are examined. From the information available a characterization of the student's conception of self-performance is presented.
4. Student behavior while interacting with the teacher is examined. This description includes both a quantitative and qualitative analysis of the interactions as observed at the overt level. Also, an analysis is made of the covert behavior of both the student and teacher during some of the interactions.

In the profiles frequent reference is made to higher or lower ability, higher or lower self-expectations, and higher or lower teacher's performance expectations for a student. Unless qualified otherwise, "higher" refers to above average for the class, while "lower" refers to below average for the class.

TINA

Biographical Information

Tina was the second of three girls in her family. Her elder sister attended senior high school, while her younger sister was in Grade 3. The father was not living with the family in their apartment unit in the neighborhood of the school. Her first four years of life were spent in a rural community before the family moved to their present home.

Tina was aged 11 years and reported bike-riding and reading to be her main interests. She enjoyed watching television, especially movies. The family had travelled to British Columbia and to the north-west areas of the United States of America.

As part of her involvement in school life, Tina was a library helper, a traffic patrol warden, and also acted as a helping hand in a lower grade classroom during after-school hours. She participated in all the usual extracurricular activities such as sport, music, and so on.

In the classroom Tina judged mathematics, health, and social studies as her best subjects. Her preference for mathematics was based on a liking for the challenge at working with numbers. Tina had one close friend in the classroom but reported she liked most, if not all students.

The teacher described Tina as a girl of average to slightly above average performance in mathematics, but with the potential for much better achievement. Tina was perceived by the teacher to be a good, happy-go-lucky student who was easily satisfied, and who did not seem overly concerned with a refined work performance just so long as the work was done.

> Teacher: You normally expect a girl's book to be quite neat, but not Tina. Like, she'll do all her math in a felt pen. She won't use a pencil because she thinks it neat to use a felt pen.

In response to the question of "Why do you come to school?", Tina stated that she needed the education. This would enable her to get a good job which would mean she would not have to work too hard! Tina also pointed out that she liked school.

The formal descriptive data on Tina supported the teacher's comment. A 72 percentile for achievement in mathematics at the Grade 5 level, as indicated on the school cumulative records, represented a higher achieving student. The PAPS total expectation score of 149 was one of the highest scores recorded by the students in Tina's class and reflected a high degree of expectancy of success in performance across six subject areas. Her mathematics sub-score of 25 out of 28 suggested that her expectations for this subject area were also relatively high. Examination of her responses indicated that Tina expected to always enjoy math, expected to learn all there was to learn, and expected to be better at math than most kids, but not one of the best in the class.

Tina's self-reporting of internal responsibility for success or failure on the IAR revealed that out of 34 situations she attributed 26 to internal causes and 8 to external causes. Because her internal responsibility for success score of 14 was close to being equivalent to her internal responsibility for failure score of 12, it can be concluded that Tina assumed credit for causing good things to happen in much the same way as she accepted blame for unpleasant consequences. Examination of her responses supported this conclusion, but with one notable exception. With items pertaining to task difficulty, success on easy tasks was attributed to external causes, whereas failure on difficult tasks was attributed to internal causes.

Quantitative Analysis of Behavior

Tina's behavior during the 10 lessons on mathematics was divided into covert and overt aspects.

Overt Behavior

Tina's overt behavior was recorded on the category system for analyzing student overt behavior which was described in Chapter IV. The number of recorded observations of her overt behavior in each of the categories in the three main lesson situations for each lesson was expressed as a percentage of the total number of recorded observations of Tina's overt behavior identified in that lesson. The results of this analysis are shown in Table 6.

Within-category of lesson situation percentage distributions of means of overt behaviors are presented in Table 7, while the condensing of Table 7 according to categories of student overt behavior is shown in Table 8.

The majority of Tina's time was spent in the lesson situations of teacher-led whole class instruction and in seatwork; these situations accounting for approximately 48 percent and 45 percent, respectively, of the learning time. In all lesson situations a

Table 6

Percentage Distributions of Student Overt Behaviors in Each Lesson Situation Category for Each Lesson : Tina

Categories of Student Overt Behaviors Within Lesson Situations	Lessons										Percentage Mean	Within-Category Sum of Percentage Means
	1	2	3	4	5	6	7	8	9	10		
Teacher-Led Whole Class Instruction												47.6
Attending-listening	16.7	60.7	22.8	39.3	28.8	18.9	22.0	58.5	11.6	87.5	36.7	
Not attending-listening	20.8	3.3	12.3	--	1.9	9.4	30.0	7.3	--	9.4	9.4	
Interacting with other students	--	--	--	7.1	1.9	--	--	2.4	--	3.1	1.5	
Out of desk	--	--	--	--	--	--	--	--	--	--	--	
Student Demonstration Whole Class Instruction												7.8
Attending-listening	25.0	--	1.7	--	5.8	--	2.0	4.9	--	--	3.9	
Not attending-listening	20.8	--	1.7	--	--	--	14.0	--	--	--	3.7	
Interacting with other students	--	1.6	--	--	--	--	--	--	--	--	0.2	
Out of desk	--	--	--	--	--	--	--	--	--	--	--	
Seatwork												44.6
Attending-listening	12.5	26.2	47.4	50.0	57.7	56.6	28.0	26.8	83.7	--	38.9	
Not attending-listening	--	3.3	1.7	--	--	1.9	2.0	--	--	--	0.9	
Interacting with other students	--	4.9	--	--	--	11.3	--	--	--	--	1.6	
Out of desk	--	--	12.3	3.6	3.8	--	2.0	--	4.6	--	2.6	
Supervised by teacher	4.2	--	--	--	--	1.9	--	--	--	--	0.6	

Table 7

Percentage Distributions of Means for Student Overt Behaviors Within Each Category of Lesson Situations : Tina

Categories of Lesson Situation	Categories of Overt Behavior	Within-Category Percentage Distributions of Means [a]
Teacher-led whole class instruction	Attending-listening	77.1
	Not attending-listening	19.7
	Interacting with other students	3.1
	Out of desk	--
Student demonstration whole class instruction	Attending-listening	50.0
	Not attending-listening	47.4
	Interacting with other students	2.5
	Out of desk	--
Seatwork	Attending-listening	87.2
	Not attending-listening	2.0
	Interacting with other students	3.6
	Out of desk	5.8
	Supervised by teacher	1.3

[a] Means for student overt behaviors derived from Table 6.

Table 8

Percentage Distributions of Student Overt Behaviors for Total Lesson Time : Tina

Categories of Student Overt Behaviors	Lessons										Percentage Mean
	1	2	3	4	5	6	7	8	9	10	
Attending-listening	54.2	86.9	71.9	89.3	92.3	75.5	52.0	90.2	95.3	87.5	79.5
Not attending-listening	41.7	6.6	15.8	--	1.9	11.3	46.0	7.3	--	9.4	14.0
Interacting with other students	--	6.6	--	7.1	1.9	11.3	--	2.4	--	3.1	3.2
Out of desk	--	--	12.3	3.6	3.8	--	2.0	--	4.6	--	2.6
Supervised by teacher	4.2	--	--	--	--	1.9	--	--	--	--	0.6

significant amount of Tina's behavior was attending and/or listening, that is, on-task. As Table 7 indicates, for teacher-led whole class instruction, Tina was observed to be on-task for a mean across the 10 lessons of approximately 77 percent of the time, and for student demonstration whole class instruction she was observed to be on-task for a mean of approximately 50 percent of the time. At seatwork, Tina was observed to be attending for a mean of approximately 87 percent of the time. Table 8 indicates that attending-listening behaviors were observed to account for a mean of nearly 80 percent of Tina's overt behavior across all mathematics lessons.

Most of the balance of Tina's overt behavior was coded as not attending-listening directly. However, Table 6 shows that not attending-listening behaviors were observed to occur for a mean of approximately 20 percent of the time with teacher-led whole class instruction, 47 percent of the time with student demonstration whole class instruction, and 2 percent of the time with seatwork. Overall, as shown in Table 8, Tina was observed to be not attending-listening for a mean of 14 percent of the time. Relatively few observations of Tina's overt behavior were recorded in the other categories of interacting with other students and out of desk. During seatwork, Tina was observed to be out of her desk for a mean of 6 percent of the time.

In quantitative terms, Tina was observed to be on-task much of the time during most lessons. This feature of her behavior was particularly prominent during seatwork. She was most likely to be not attending when other students were demonstrating an idea to the whole class. Tables 6 and 8 indicate that lessons 1 and 7 were days when Tina was coded as not attending or listening more than 40 percent of the total lesson time. In lessons 3 and 6 she was observed to be not attending for 16 and 11 percent, respectively, of the total lesson time. The daily variations were deemed to be significant but can only be explained from an analysis of Tina's thought processes.

Covert Behavior

Tina's reported covert behavior during each lesson was divided into interactive and non-interactive thoughts and feelings. Only the interactive thoughts and feelings--the actual thoughts and feelings experienced during the lesson--were quantified. The content analysis system of student interactive thoughts, CASSIT, was used for this purpose. The number of Tina's interactive thought units in each of the nine categories for each lesson was expressed as a percentage of the total number of thought units identified in that lesson. In Table 9 the results of this analysis are presented.

Most of the thoughts reported by Tina were usually behavioral moves--self, behavioral moves--student, self-performance--thoughts, and feelings. Cognitive processes, non-task-related, and behavioral moves--teacher were categories of thoughts reported on an average of 5 to 10 percent of all thoughts. Relatively few thoughts in the categories of subject matter and self-performance--feelings were reported.

For Tina, the interactive thoughts in six categories were further analyzed according to sub-categories of what the thoughts were about. Five of these categories had the highest frequencies of

Table 9

Percentage Distributions of Student Thoughts Over CASSIT Categories for Each Lesson : Tina

Categories of Student Covert Behavior	Lessons										Per-centage Mean
	1	2	3	4	5	6	7	8	9	10	
Subject Matter	--	8.1	--	--	3.1	4.8	2.6	--	--	--	1.9
Cognitive Processes	6.2	21.6	8.0	3.4	3.1	4.8	2.6	6.4	3.7	--	6.0
Behavioral Moves--Self	21.9	8.1	20.0	20.7	21.9	26.2	28.9	22.6	7.4	21.2	19.8
Behavioral Moves--Student	15.6	27.0	12.0	10.3	18.7	2.4	10.5	3.2	14.8	21.2	13.6
Behavioral Moves--Teacher	15.6	5.4	4.0	10.3	9.4	11.9	10.5	9.7	14.8	3.0	9.5
Self-Performance--Thoughts	9.4	18.9	28.0	37.9	25.0	35.7	15.8	29.0	33.3	27.3	26.0
Self-Performance--Feelings	--	2.7	4.0	--	--	4.8	--	9.7	11.1	12.1	4.4
Feelings	18.7	5.4	16.0	3.4	9.4	4.8	7.9	16.1	11.1	9.1	10.2
Non-Task-Related	12.5	2.7	8.0	13.8	9.4	4.8	21.1	3.2	3.7	6.1	8.5

occurrence, while self-performance--feelings was sub-categorized for purposes relevant to the direction of the study and for purposes of later comparison with other students. The results of this more intensive analysis are shown in Table 10.

Behavioral moves--self. Behavioral moves--self, the thought units in which the student reports her thoughts about an action she was performing, had performed, or was considering performing in relation to the learning process, were further analyzed in terms of the kinds of motives and mental behaviors which prevailed while the student was learning. Table 10 reveals that, of her behavioral moves, Tina's reported thoughts were frequently focused on attending-listening as well as the motives for attending or for avoiding attending. Tina's interactive thoughts of seeking or avoiding public participation accounted for 9 percent and nearly 8 percent, respectively, of all her behavioral moves--self thoughts.

Behavioral moves--student. Thought units in which the student reported her thoughts about an action involving other students were sub-categorized in an attempt to identify the nature and extent of student concern with peers during learning. Table 10 shows that Tina was aware primarily of what other students were doing. She was also frequently concerned about and aware of other students' successes and failures. To a lesser degree, Tina reported thoughts in which she was inferring or interpreting what other students were thinking.

Behavioral moves--teacher. Sub-categories were also used for those thought units in which the student reported her thoughts about

Table 10

Within-Category Percentage Distributions of Sub-categories of Selected Student Thought Categories of CASSIT : Tina

Sub-categories of Selected CASSIT Categories of Student Thoughts	Within-Category Percentage Distributions
Behavioral Moves--Self	
Seek public participation	9.01
Avoid public participation	7.58
Attending-listening	36.55
Not attending-listening	1.52
Motive to attend	18.18
Motive to avoid attending	18.18
Motive to use a technique	7.58
Motive to avoid use of a technique	1.52
Behavioral Moves--Student	
Perceptions of other students' performances	31.82
Inferences of other students' thoughts	15.91
Interaction--positive	6.82
Interaction--negative	2.27
Perceptions of other students' behavior	43.18
Behavioral Moves--Teacher	
Perceptions of teacher's instructional moves	25.81
Perceptions of teacher's reactions	12.90
Interactions	16.13
Perceptions of teacher's overt behavior	45.16
Self-Performance--Thoughts	
Self-assessment--success	16.67
Self-assessment--failure	11.90
Perceptions of task difficulty	21.43
Perceptions of task structure	28.57
Self-attributions	2.38
Self-expectations	11.90
Significant Other	7.14
Self-Performance--Feelings	
Anxiety	7.14
Morally neutral--positive	35.71
Morally neutral--negative	14.29
Morally unneutral--positive	---
Morally unneutral--negative	42.86
Feelings	
Positive	68.75
Negative	31.25

an action involving the teacher. These were intended to enable observation of some of the kinds of thoughts about teachers which students experience during learning. Table 10 indicates that Tina was aware of what the teacher was doing and also reported thinking about the teacher's instructional moves. Fewer of Tina's reported thoughts pertained to interactions with the teacher and an awareness of the teacher's reactions to situations in the lessons.

Self-performance--thoughts. These interactive thought units represented the primary focus of the study. They refer to thought units in which the student is thinking about his or her performance behavior and outcomes. Tina's reported thoughts pertaining to her successes and failures accounted for nearly 29 percent of her self-performance interactive thoughts, with the successes being considered more frequently than the failures. Perceptions of tasks, in terms of difficulty and of structure, accounted for 50 percent of her self-performance thoughts. Thoughts involving self-expectations were expressed less frequently, yet they were consistently present across most lessons.

Self-performance--feelings. Thought units in which an emotion related to self-performance was expressed by a student were analyzed further according to anxiety, morally neutral, and morally unneutral sub-categories. Of the few self-performance feelings reported by Tina, Table 10 reveals that morally neutral positive feelings, such as happiness and pleasurable surprise, and morally unneutral negative feelings, such as feelings of shame, occurred most frequently.

Feelings. Thought units in which feelings were expressed in relation to the class, the lesson, and other general matters, were considered to reflect a student's overall view of the learning situation and indirectly contribute to her behavior and her thoughts about self-performance while learning. Approximately two-thirds of Tina's expressed thoughts revealed positive emotions such as enjoyment, pleasurable surprise, and amusement, while one-third of her expressed thoughts in this category revealed negative emotions such as worry, shame, annoyance, anger, and boredom.

Summary of Quantitative Analysis of Behavior

The quantitative analysis of Tina's overt and covert behavior during the lessons provided some description of her behavior during learning. Most of the time she was observed to be on-task, especially during seatwork. Not attending-listening behaviors, when coded, mainly occurred during lesson situations which required her to watch or listen. The majority of Tina's reported interactive thoughts focused upon the self, namely, her own performance and her behavior in the learning process. Few feelings related to self-performance were reported. Most of her reported self-oriented thoughts referred to task-related matters of how she perceived the task and her attention to tasks. These findings support the strong trend for the on-task overt behavior noted earlier. Self-assessment and self-expectation thoughts were frequently reported to occur as well.

Other frequently occurring interactive thoughts which Tina reported included an awareness of what other students and the teacher were doing, how other students were performing, and expression of a variety of emotions about matters pertaining to the classroom and lessons generally. An interesting feature of Tina's thoughts was the occasional reference to perceiving why the teacher adopted a particular strategy of teaching or mode of behavior.

Finally, the percentage distribution of Tina's reported interactive thoughts indicates few references to the subject matter of mathematics or the thinking processes involved in learning mathematics.

Attributional Analysis of Self-Performance Covert Behavior

A significant proportion of Tina's mental activity during the learning of mathematics pertains to components of self-performance thoughts and feelings. An analysis of the qualitative aspects of this covert behavior revealed the relationships between the thoughts expressed and also pointed to the base of ideas, views, beliefs, emotions, and lines of reasoning which were perceived to underlie these relationships. The relationships tended to be causal in nature, hence an attributional analysis of these thoughts and feelings was deemed appropriate.

Causal Explanations of Tina's Behavior

The transcripts of the interviews with Tina contained several chains of comment which included causal explanations of behavior and causal perceptions of performance. Her report of an initial cognition, which sometimes included an emotional consequence, often referred to an aspect of self-performance. Tina sometimes provided or readily disclosed reasons for these thoughts and usually described consequent behaviors which stemmed from such cognitions. In collating these chains of comments five clusters were discerned which referred to common cognitions, perceptions, and motives of behavior, namely, approach to learning, task difficulty, specific performances, public participation, and perceptions of other students' performance. Each cluster of Tina's chains of comment is described with examples and anecdotes included.

Approach to learning. Tina's pattern of behavior when challenged with new or difficult material seemed quite consistent. The pattern was exemplified by:

> . . . and then the first answer was right but I still don't get it. It was just a guess for the first one. So I'm going to talk to her about it tomorrow. (Lesson 2)

Tina's approach to learning can be described as mastery-oriented and persistent under these circumstances. When the teacher was introducing new work or the work was hard she always listened.

> Because usually I listen when I'm...like something new I always listen, I know that. (Lesson 1)

> But I listen when it comes to things that are hard, but I just go on if it's something I know. (Lesson 7)

Where Tina did not understand a discussion point or worksheet problem then she was motivated to call upon the help of the teacher:

> Let's say I don't understand something...then I'm not afraid to ask. I'll even put up my hand to tell the wrong answer so that I'll find out how to do it. (Lesson 3)

During the unit test, Tina became worried when she couldn't complete one problem. Aware that some answer was possible she persisted, even under the increased stress of the situation, until the solution was found.

Tina's approach to learning challenging material seemed systematic and highly motivated. Realizing that a new or difficult task had to be learned, she was able to increase the effort input in order to gain a sense of satisfaction in understanding the material or task.

Task difficulty. Tina made frequent reference to the ease of the subject matter to be learned and to the simple worksheets and exercises to be done. Often these comments were accompanied by the expression of disdain or disgust and by references to having learned the material in previous years.

> I felt...you know it seems like we were in a kindergarten class or something or a lower grade class because it's all review from those years and my little sister just took that last year. And it's easy. It was easy for her. It's all review from other years. (Lesson 7)

> T: It [the worksheet] was pretty simple.
> I: Did you have time to finish it?
> T: Yes. I have handed it in already.
> I: Why do you think you found it pretty simple?
> T: Well, see, last year, that was something we were very good at because I never took anything like that before, and I really enjoyed that section of maths. And that's how I can remember it...it was so good. (Lesson 3)

When the lesson situation was teacher-led whole class instruction, Tina made statements such as:

> Sometimes things are so boring that I feel like doing something, so I eat. Sometimes I draw, but that draws away my attention from the board and then I might miss something. (Lesson 5)

> Like, we took turns and slides and motion...motion geometry, we took all that last year. And I didn't really have to listen that good. I'd wake up [had been dozing--aftermath of Hallowe'en]

> and then she would be saying something else and I didn't even know what she was talking about because I just remembered what I heard before. (Lesson 3)

On other occasions when Tina perceived the discussion to be centered on easy material she would spend time completing other written work or engage in intellectual leisure retreats such as crosswords. Tina nevertheless tended to keep tuned in to the lesson sufficiently to follow the drift of the lesson, cueing to what she learned in previous years for checking progress of the discussion. On some occasions she reported different behaviors: "Sometimes I look at the teacher...I hear what she says but I'm not really listening. She thinks I'm concentrating" (Lesson 6).

Tina's typical reaction to easy or familiar worksheets was to start immediately and not wait to follow the teacher's step by step "lead-in" to the task. Again she reported review as the main reason for finding the material simple, even stating on one occasion: ". . . actually it was a worksheet I got last year so I knew all the answers" (Lesson 4). Sometimes Tina initially perceived the task to be easy, yet found it more difficult once she "got into it": "I felt dumb because, I mean, I thought this was going to be easy and then get into it and it's not so easy after all" (Lesson 2). At other times the reverse applied when she found hard looking worksheets to be easier than expected.

In general, when Tina perceived task difficulty to be easy, the cognition seemed to be accompanied by feelings of boredom and a sense of disgust. She generally attributed the easy level of material to the external factor of review and, as a consequence, engaged in a variety of alternative behaviors. A number of underlying points of view and beliefs were associated with these chains of comment but these will be described later.

Specific performances. Tina made frequent reference to specific successes and failures and often accompanied these with an expression of an emotion.

> T: I wasn't sure whether it was right or not and I got it wrong, and I was mad.
> I: Why do you think you got it wrong?
> T: I didn't check it--I just did it with my eyes. I didn't bother checking it. (Lesson 6)

In this example lack of effort was cited as the primary reason for failure, though she also added that the diagram on which she was working was poorly printed.

On the few occasions when Tina had difficulty in perceiving task structure she tended to become confused and often experienced temporary failure. Where this involved another student, feelings of embarrassment were experienced: "Tom was right and he kept on saying, 'You're wrong but I'm right.' And then I found that I was wrong. I felt stupid" (Lesson 6). Instances of temporary failure did not seem to give rise to intense feelings. Causal explanations tended to revolve around insufficient effort on Tina's part which she readily counteracted given her mastery-oriented approach to learning.

Intense feelings were reported to have been experienced when Tina received back her result on the unit test.

> I: How did you get on in the test?
> T: I did actually very good, I would say. I was pleased with myself. I expected that.
> I: Why do you think you did so well?

> T: Well, because I listened. You know I learned and I did my worksheets pretty good. I thought I did a good job and it should get me a good mark on my report card so my Mom can spoil me or brag about me. (Lesson 10)

This item sample provided some clue to the reason for the intensity of feeling and also indicated clearly Tina's view about the major success having resulted from her input of effort. Incidental successes during the learning of mathematics in this unit were attributed by Tina to ease of learning material, as described earlier.

Public participation. Tina generally preferred not to volunteer a response during discussion or offer to demonstrate an idea in front of the whole class.

> I just don't like to answer questions. I know what it [the discussion] is about. I just don't want to...I guess it gives someone else a chance who doesn't know who wants to find out. I am afraid I'd get laughed at if I got it wrong. When I know the answer, I just don't like to tell. It's just me. (Lesson 3)

This and other item samples suggested that the influence of peer effects played an important role in relation to participating publicly in front of the class. Tina tended to avoid placing herself in situations in which she would feel embarrassment in front of her peers. "Sometimes I say the stupidest answers and I think they are right at the time. But when I find out the right answer I think I'm so stupid you know" (Lesson 5).

On some occasions Tina chose to put her hand up and, as already described, volunteer a wrong response in order to find out the correct answer. On one occasion she reported that she felt like volunteering all the time on that particular day. In paraphrasing this one chain of comments, Tina felt glad but surprised that the teacher had selected her to respond, for she had perceived that the teacher usually asked the same persons over and over again. Tina's explanation for this pattern of the teacher's behavior was:

> Sometimes I think that she asks people because she can tell... like if they don't know something, she can tell, and then when they don't know she can explain it. And it seems that she just knows when you don't know. And then some, she knows that they know it and that they can show the others. (Lesson 5)

Perceptions of other students' behavior. While Tina was disinclined to demonstrate ideas in front of the class herself, she tended to observe critically other students' efforts in this regard. A mixture of emotions seemed to accompany these perceptions.

In general, where other students' motives to demonstrate ideas in front of the class were perceived by Tina to be mainly non-task focused her thoughts and feelings tended to be negative. She experienced annoyance when she perceived students going to the front of the class in order to be the focus of everyone's attention. Motives of this kind conflicted with her own reasons for volunteering or not volunteering to publicly participate.

Where other students were perceived by Tina to be not attending sufficiently, negative feelings of a different order were experienced. On watching a less successful student trying to demonstrate an idea which was impossible, she obviously experienced feelings of derision toward the peer:

> Oh Lisa, you're nuts, ...you're stupid!" 'Cause...it was so simple, I mean, my little sister would have known that. (Lesson 2)

In another case, Tina considered another student to be "kind of dumb" for working at the most difficult item and not noticing the most obvious point. Again, other students' lack of attention to the task seemed to conflict with Tina's personal reasons for publicly participating.

Tina's Basic Ideas and Beliefs

Underlying the causal explanations and perceptions of Tina's self-performance related behavior in the learning of mathematics were a number of ideas, beliefs, views, emotions, and lines of reasoning. These base thoughts seemed to be interrelated with and influence significantly Tina's behavior which would be apparent to the teacher and the other students in the class.

Reasons for success. One central belief of Tina's which pervaded all interviews was her direct association between student success and the amount of effort which students expend in the learning process.

> T: You know if you just use your brains you can do something you want. Some of them, they...you know, you can tell, like they are smart kids but they just don't use their brains.
> I: What about other kids you think are not smart?
> T: Well they are smart. Like, you know just not as good as some others. Because they don't try, they don't like the subject, they don't bother trying. And since they don't get things right they hate it even more, you know. (Lesson 5)

Tina believed she broke this perceived circle by trying harder.

> A couple of years ago I used to hate maths, now I really like it. Just because, I guess, I'm trying harder and I get a lot right and hardly any wrong. (Lesson 5)

These notions surfaced readily in discussions about the unit test and other student performances. She felt disappointed that some class members had scored low: "I mean, that's real bad for Grade 6. He [a low scoring student] should be paying attention" (Lesson 10).

As one explanation for this performance level, Tina reported that these students have "lots of brains but they don't bother trying." Another explanation provided by Tina was:

> T: They still can't understand it but they are dumb. They won't go up and tell. They won't understand. I'm not afraid to go up there because she helps you.
> I: Why do you think they were afraid to go up?
> T: Well...they are afraid they will get embarrassed in front of the class. And that's their biggest problem because "Who cares what the other kids think, really?" Let them think what they want to, that is what I say. (Lesson 10)

Tina's rationalization was expressed at a time of personal success, yet it was consistent with her approach to learning described earlier. However, the thought seemed to conflict with her own reluctance to publicly participate in class for fear of being laughed at by the other students if she was wrong.

Tina often referred to instances of keeping one ear tuned on what the teacher was saying during teacher-led whole class instruction while at the same time concentrating on some off-task activity. This was her mode of handling lesson content which she perceived to be review. "I don't believe I have to listen if I know it already" (Lesson 7). When questioned as to what she would do if the teacher suddenly asked her a question, Tina replied: "Well...I was prepared to take the risk. You know, I know symmetry and she...I would just ask what the question was again and she would tell me and then I would know" (Lesson 7). Tina made conscious attempts to give the impression of listening to the teacher by sometimes putting up her hand without knowing the teacher's question or by occasionally looking at the teacher yet without listening to what was being said.

Tina's belief that success in classwork was related to how hard a student worked or listened was reinforced by comments comparing her efforts to remain tuned in to the teacher while involved with off-task activities and other students who became totally distracted and who did not listen at all. Even with easy worksheets she was critical of students who did not work on ahead but who preferred to waste time listening to the teacher's preamble when they already knew what had to be done.

Perceptions of her own mathematics ability. Tina perceived herself to be a good student at mathematics. "I think I'm pretty good at math because I try harder and I get my homework done all the time" (Lesson 5). She disclosed similar thoughts in the interviews which embraced the unit test situation. Before the test she expected to do well by answering correctly most, if not all the questions. Tina felt that she had worked hard and that it would be just a matter of accuracy. On the test day she reported that she had not studied for the test because, "I didn't think I needed to". Reinforcement of her beliefs was provided by the test results from which she concluded: "I did better than some of the girls that I thought were smarter at math than me" (Lesson 10).

Tina's higher performance self-expectations in mathematics seemed to be perceived clearly and these were attributed largely to the reasonable amount of effort she expended in the learning situations. But Tina also felt the teacher's performance expectations of her were correspondingly high.

Tina's perception of the teacher's performance expectations of herself. Tina's belief that the teacher held higher performance expectations for her seemed to be based on a number of perceptions and observations which had led her to conclude:

> Well I don't think she thinks I'm bad at it [mathematics] but I'm not one of the best. She probably thinks I'm pretty good I think. (Lesson 6)

Tina's belief regarding the teacher's performance expectations of her were readily disclosed during interviews involving the unit test situation. The day before the test she expected the teacher was "going to think pretty well of her after the test." When the results of the test were announced, Tina's comments were:

> Well she will think I'm pretty good...she won't be surprised though...She probably thinks that I am a little bit better maybe than I think. (Lesson 10)

Occasionally Tina referred to aspects of her behavior from which the researcher surmized that she was concerned with preserving or maintaining the teacher's performance expectations held towards her. The attending behaviors of providing the teacher with an impression that she was listening to the teacher-led whole class instruction while mainly being off-task confirmed this interpretation. On one occasion Tina lost her mathematics book and spent much of the teacher-led oral discussion searching in her desk. She was worried lest the teacher perceived her to be not listening. "She wouldn't really be mad but she would be kind of disappointed" (Lesson 1). Tina explained that the teacher would be surprised to find her not listening, whereas with other students who regularly did not listen she would not be surprised and so would get upset with them.

Early in the year, with review type mathematics, Tina found herself not succeeding. This worried her because "maybe she [the teacher] must think I was crappy at first" (Lesson 6). Tina was concerned with the early impressions which the teacher formed of her.

While Tina's concern with the performance expectations held by the teacher for her "surfaced" on a number of occasions, she did express a point of view which seemed to deny the notion of concern.

> It matters what I think about myself, and what she thinks, I don't...like, about my work, if she thinks I'm not trying well maybe I'm not. But if she thinks I'm not trying and I am, well then I just don't care what she thinks. Because I know what I think. It doesn't matter that really...it matters what I think...I know when I'm not trying. (Lesson 6)

A later comment by Tina suggested that this reasoning stemmed from the model provided by the mother. Tina explained that if she did poorly in the unit test her mother would hassle her if she knew that Tina "had not tried." But if Tina "had tried" the mother would be disappointed but would not hassle. Tina found the position which her mother adopted to be very helpful.

Perceptions of other students' performances. Tina perceived clearly the relative mathematics performances of other students in the class. She was able to place most students into a mathematical hierarchy in relation to herself. Their mathematical competencies as revealed by their work and by the way they answered questions in class contributed to the clear perception. Tina was very aware that the teacher spent a greater proportion of time with some students who had problems.

During the unit test Tina reported being unconcerned with the performances of the other students. Those who finished the test early were perceived "to be real good at maths or that they weren't even trying." When the test results were announced she guessed which students performed poorly. Tina chose not to share her result with a student who scored low "because it would make her feel bad." She expressed surprise at which boy had scored highest, but noted that boys do better in mathematics because girls like more the language arts.

The teacher had preceded the handing back of test results with an explanation of the distribution of marks, the average mark for the class, and why students who scored very well would be recognized. Tina approved of these procedures because they helped in identifying her relative standing in the class. They also publicly rewarded those students who had been listening and attending during the learning sessions of the mathematics unit.

Perceptions of tasks and activities. Tina believed the listening and the worksheet facets of learning mathematics to be mutually significant. She pointed out that the listening parts of lessons, such as teacher-led whole class instruction, were important because they enabled the worksheets to be completed. The worksheets were viewed as the parts of the lessons where she worked hardest and were the parts she remembered most about lessons.

In terms of difficulty of tasks, Tina preferred hard worksheets.

> I: Why would you prefer to have hard work?
> T: I like straining my brain. I don't know why. 'Cause then I feel good. (Lesson 6)

She seemed unconcerned that hard worksheets could increase her chances of failure.

> I will just have to see if I don't understand it and just check it over. It doesn't worry me because that's how you learn...by your mistakes. (Lesson 6)

These comments reflected Tina's mastery-oriented approach to learning.

Finally, on numerous occasions Tina referred to "getting a good mark on her report card." As an underlying motive for much of her behavior, this thought appeared to be salient in that it pervaded her thoughts about attending, her views about tasks, and her reasons for achieving well on the unit test. The teacher probably was seen by Tina as the significant person in the classroom to realize the good mark on the report card. Tina's motive for being concerned at the kind of performance expectations the teacher formed and maintained toward her can be interpreted readily from the evidence described in this attributional analysis of behavior.

A Characterization of Tina's Conception of Self-Performance

Tina became the focus of this study because she was perceived to be a successful student. The results of the attributional analysis of her behavior, together with some of the relevant findings of the quantitative data, have enabled an interpretation to be made of how Tina might have perceived herself and her self-performance in the learning of mathematics. The major elements of this characterization of her conception of self-performance were:

1. Tina's approach to learning can be described as mastery-oriented, that is, she engaged in learning behaviors which

resulted in immediate or eventual success. She believed that success was the function of effort expenditure, hence perceived a clear effort-outcome covariation.

2. Tina was undaunted by what she perceived to be hard worksheets. She preferred difficult material because this enabled her to work hard, that is, to apply considerable effort which would result in eventual success.
3. Tina found success which had been gained by considerable effort expenditure to be satisfying and pleasurable. Feelings under these circumstances were more intensive. Success attributed to ease of material to be learned gave rise to negative feeling states such as boredom and scorn.
4. Tina found failures which were short-lived annoying and sometimes embarrassing. However, these feelings were of shallow intensity and temporary. Because Tina did not experience major failures, no evidence was available as to the kind of feelings which would accrue. However, there were indications of deep-seated feelings of fear if she ever performed badly.
5. Tina was reluctant to participate publicly. She avoided placing herself in situations which might prove embarrassing.
6. Tina seemed unhappy when she perceived other students' behaviors as reflecting negative or non-academic motives which conflicted with her own.
7. Tina perceived clearly the classroom achievement hierarchy in relation to herself. She approved of the procedures followed

by the teacher when giving back test results.

8. Tina believed the teacher held higher performance expectations for her, and expended effort to preserve these favorable expectations.

9. Tina valued as the ultimate goal of classroom behavior the gaining of a good mark on her report card. She clearly perceived the expenditure of effort to be the means of achieving this goal. The teacher and parent apparently had transmitted successfully to Tina the societal value of effort. But the gaining of a good mark on her report was viewed by Tina not only as self-rewarding but as rewarding the mother, Tina's most significant love figure. Tina perceived the teacher to be the person who would provide the reward, hence the mediating role of teacher expectations. By caring about the kind of performance expectations the teacher formed and maintained about her, and maintaining a high profile on effort expenditure, Tina appeared to fulfill her desires of gaining social approval from the two most significant others--the teacher and the mother--as well as retaining a higher degree of self-esteem.

Analysis of the Dyadic Interactions Between Tina and the Teacher

Both the covert and overt behavior of Tina and the teacher were observed and analyzed for each dyadic interaction episode. The low inference classroom observation system was used to code the observable behaviors and stimulated recall methodology was used to gather the participants' reported covert behavior.

Analysis of the Overt Behaviors

The results of the analysis of the interaction sequences between Tina and the teacher are reported in Table 11 and in Figures 7 and 8. Table 11 shows that Tina and the teacher interacted dyadically 12 times during the 10 mathematics lessons. The majority of these dyadic interactions were student initiated and private in nature and occupied a total duration time of 89 seconds.

Figure 7 indicates that the four public dyadic interactions were teacher initiated, Tina volunteered on each occasion to respond, that she always answered the questions correctly, and that the teacher's feedback tended to be brief and neutral. Figure 8 shows that the private dyadic interactions were mainly student-initiated, to which the teacher responded in a more extended manner than in the public interactions. However, a substantive analysis of the interactions revealed that only two of these private dyadic interactions consisted of sustained content information exchanges. Overall, the quality of interactions between Tina and the teacher were characterized by brief, positive, and neutral communications.

The Overall Analysis of the Dyadic Interactions

Some of the dyadic interactions between Tina and the teacher were analyzed by an overall examination of the observable data, the teacher's covert behavior and the student's covert behavior. The purpose of this analysis was to attempt to describe in detail the process behaviors during dyadic interactions which might have

Table 11

Frequency Distribution of Dyadic Interactions Between Tina and Teacher

Type of Interaction	Lessons										Total
	1	2	3	4	5	6	7	8	9	10	
Teacher initiated public interaction	2	-	-	-	1	-	1	-	-	-	4
Student initiated public interaction	-	-	-	-	-	-	-	-	-	-	-
Teacher initiated private interaction	-	-	-	-	-	1	-	-	-	-	1
Student initiated private interaction[a]	1	-	-	1	-	1	-	1	3	-	7
Total:	3	-	-	1	1	2	1	1	3	-	12

[a] Duration of the student initiated private interactions was 17, 2, 32, 17, 8, 3, and 10 seconds, respectively, for a total time of 89 seconds.

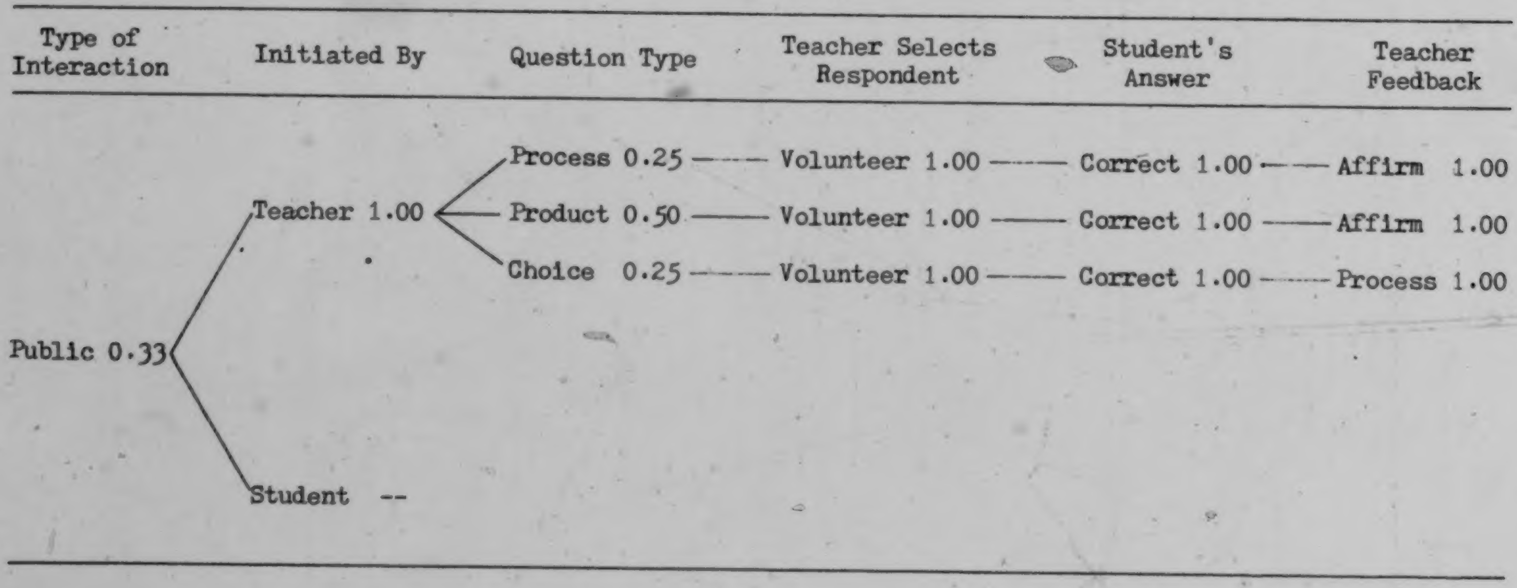

Type of Interaction
Initiated By
Question Type
Teacher Selects Respondent
Student's Answer
Teacher Feedback
Public 0.33
Teacher 1.00
Student --
Process 0.25
Product 0.50
Choice 0.25
Volunteer 1.00
Volunteer 1.00
Volunteer 1.00
Correct 1.00
Correct 1.00
Correct 1.00
Affirm 1.00
Affirm 1.00
Process 1.00

Figure 7. Nature of Public Dyadic Interactions Between Tina and Teacher and Their Proportions

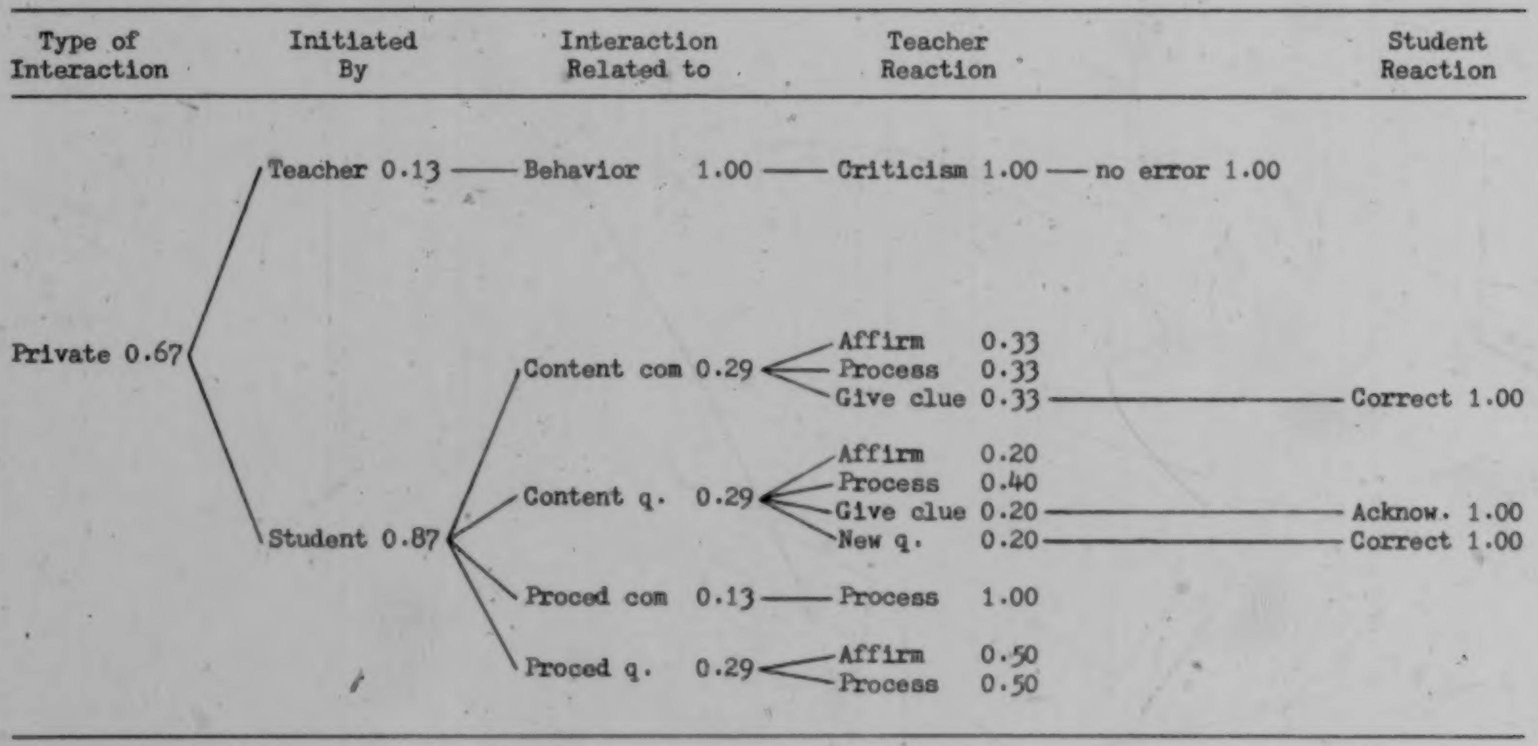

Type of Interaction
Initiated By
Interaction Related to
Teacher Reaction
Student Reaction
Private 0.67
Teacher 0.13
Behavior 1.00
Criticism 1.00
no error 1.00
Student 0.87
Content com 0.29
Affirm 0.33
Process 0.33
Give clue 0.33
Correct 1.00
Content q. 0.29
Affirm 0.20
Process 0.40
Give clue 0.20
Acknow. 1.00
New q. 0.20
Correct 1.00
Proced com 0.13
Process 1.00
Proced q. 0.29
Affirm 0.50
Process 0.50

Figure 8. Nature of Private Dyadic Interactions Between Tina and Teacher and Their Proportions

contributed to the "communication" of expectations. With Tina, the surprisingly small number of interactions meant that only a sample of behaviors could be described. Given this limitation, they are reported as items of relevant data derived from four dyadic interactions between Tina and the teacher.

During lesson 1 Tina initiated an interaction with a content comment. The teacher sustained the interaction by giving a clue, to which Tina said "Oh!" in such a way as to imply that she understood. Obviously the teacher, in reading her mind, assumed Tina had worked out the correct answer for she affirmed the as yet unstated correct response by verbalizing what she presumed was in Tina's mind. In this way the teacher provided Tina with the answer, while Tina, who had not known the answer, as learned from the later interview, had provided the teacher with the impression that she had caught on to the slightest of clues. Consequently, Tina had preserved the teacher's performance expectations held towards her.

Lesson 6 contained a similar situation. Tina initiated an interaction with a content question. The teacher provided explanations and worked through an example with Tina, at the conclusion of which she asked:

Teacher: And do we have ________?
Tina: Nods
Teacher: Hmm Hmm!!

The affirmation by the teacher reflected the teacher's assumption that Tina understood for she left Tina at that point. Tina later stated she was quite satisfied with the outcome of the interaction. This example, together with that in lesson 1, raised the possibility that by presuming Tina understood, and not checking whether this was the situation, the teacher conveyed the impression of holding higher performance expectations to Tina. Tina meanwhile used noncommittal or non-verbal messages to convey the impression that she understood to the teacher, thereby preserving the teacher's impression of her.

At an earlier point, the teacher had reported that Tina had asked for help.

> I thought at the time then it's rather unusual because she doesn't usually ask for help. She is usually an independent sort who goes right ahead and does...but she asked, so it could be that she wasn't paying attention [referring to Tina with her head on the desk]. (Lesson 4)

This comment suggested that the teacher seemed happier at finding an excuse for Tina's need for help in the form of lack of attention or effort. An attribution to lack of ability presumably would have been inconsistent with the teacher's performance expectations for Tina.

In lesson 4 Tina had asked the teacher if what she had done was correct.

> T: I asked her if that was okay.
> I: And how did she respond?
> T: She went "Aaargh!"
> I: Why do you think she said it that way?
> T: Because I don't think she hardly even looked. She knew I'd get it right I guess. (Lesson 4)

Tina's interpretation of what was coded on the low inference observation system as an affirmation type terminal teacher feedback, and recorded as a brief "Hmm Hmm," indicated an awareness and acceptance of teacher performance expectations.

An episode during the unit test in lesson 9 yielded interesting interaction information. Tina initiated two interactions, close together in time, which pertained to whether or not a test problem could be answered. Brief, noncommittal replies by the teacher left Tina searching for the problem and, at the same time, thinking: "I knew she was looking at me and I thought, 'What is she thinking?'." Meanwhile, the teacher was watching Tina intently:

> Teacher: I was hoping that I would see like the light bulb above her desk kind of go "ping"...a look of recognition or discovery that she had got it.

These comments can be interpreted as the teacher apparently waiting for confirmation of her expectations, while Tina might have been concerned that the maintenance of the teacher's performance expectations of her could be at stake to some extent.

The items of dyadic interactions described above seemed to constitute a very limited range of the interaction process behaviors between Tina and the teacher. Yet the sample of 4 interactions from a total of 11 dyadic interactions across the 10 mathematics lessons appeared to contain elements of performance expectation behavior on the part of both Tina and the teacher. This might indicate a relatively high incidence of performance expectation behavior across a wider sample of lessons and subject areas.

A plausible interpretation of the evidence presented seemed to confirm that the teacher held higher performance expectations for Tina. Her behavior toward Tina included a number of subtle yet non-deliberate process behaviors which appeared to convey to the student that the teacher expected her to succeed. The teacher's verbal comments also contained strongly suggestive evidence for the existence of these expectations. Tina's verbal reports indicated clearly that she was aware of the teacher's performance expectations of her. She seemed to adopt subtle interaction behaviors which appeared to be motivated by the desire to preserve the higher performance expectations held by the teacher of her.

Summary Analysis

The results of describing Tina's behavior during the learning of mathematics have established some tentative relationships among and between Tina's conceptions of self-performance, Tina's causal perceptions of success and failure, Tina's achievement-related behavior, the teacher's behavior towards Tina, and the teacher's causal perception of Tina's performance.

1. Tina valued the gaining of a good mark on the report form as the goal of classroom behavior.
2. Success in achieving this goal was perceived by Tina to be dependent upon the expenditure of effort.
3. The teacher was perceived by Tina to be the person who granted the reward of a good mark on the report form.
4. The teacher was perceived by Tina to approve of effort expenditure as the main criterion for success.
5. The teacher was perceived by Tina to hold higher performance expectations for her.
6. Tina perceived these teacher performance expectations for her were based on her effort-oriented behavior.
7. Tina was viewed as a student who was mainly on-task.
8. The teacher held higher performance expectations for Tina based on attribution to ability and effort.

9. The teacher appeared to "communicate" these expectations to Tina by subtle yet probably non-deliberate process behaviors.
10. Tina appeared to consciously engage in behaviors which were designed to preserve or maintain the performance expectations held by the teacher toward her, that is, to be perceived as a successful student who expended considerable effort in her work.
11. Tina was a successful student because she was mastery-oriented in her approach to learning.

MIKE

Biographical Information

Mike was the only child of a family living in a private home in the neighborhood of the school. He was born in a mining town in Ontario and had lived in Edmonton for the past five years.

Mike was aged 11 years and reported bottle collecting and reading to be his main interests. He watched some television, especially "Disneyland" and "House on the Prairies." The family had travelled extensively in Canada and during 1979 were expecting to move for a one or two year stay in South America.

As part of his involvement in school life, Mike was a library helper, a team soccer referee, and a patrol warden. In the classroom he especially enjoyed social studies, but reported liking most subjects. In mathematics he felt he was doing well but stated that "it gets boring if we repeat work done before." Mike had two close friends whom he noted were similar to him. They apparently shared experiences and activities during recess and after school. In response to the question "Why do you come to school?", Mike replied briefly, "I like to and I have to."

The teacher described Mike as a student of above average ability. While his work was perceived to be messy, she noted that he worked very hard. The school cumulative records indicated that Mike had gained an achievement percentile of 89 in mathematics, which suggested he was a high achieving student.

The PAPS total expectation score of 145 reflected a high degree of overall expectancy of success. His mathematics subscore of 25 out of 28 suggested that his expectations in mathematics were consistent with the overall pattern. Examination of Mike's responses to the mathematics subsection of the PAPS indicated that he expected to always enjoy math, he expected to learn all there was to learn, and he expected to be better at math than most kids but not one of the best in the class. Mike did expect to do very well in math when he got older.

Mike's self-reporting of internal responsibility for success or failure on the IAR revealed that out of 34 situations he attributed 24 to internal causes and 10 to external causes. The subscores for internal responsibility for success of 15 and for internal responsibility for failure of 9 suggested that Mike assumed credit for causing good things to happen in a different way to which he accepted blame for unpleasant consequences. Examination of his responses on the IAR indicated some possible areas of differential responses. Where effort or attention by Mike was pitted against teacher's explanations, the need for help, or other students' distraction, Mike claimed responsibility at times of success, but placed the blame on external factors at times of failure. This pattern of response on the IAR was almost non-existent when effort or attention by Mike was pitted against task difficulty and significant others' thoughts about Mike. His internal responsibility for success was close to being equivalent in these circumstances.

Quantitative Analysis of Behavior

Mike's behavior during the nine lessons which he attended was divided into covert and overt aspects for analysis purposes.

Overt Behavior

The results of the analysis of Mike's overt behavior are shown in Tables 12, 13, and 14. Table 12 indicates that the majority of Mike's time was spent in the lesson situations of teacher-led whole class instruction and in seatwork; these situations accounting for approximately 45 percent and 47 percent, respectively, of the learning time. A considerable amount of Mike's behavior in all lesson situations was attending-listening on-task behavior. As Table 13 indicates, Mike was observed to be on-task for a mean across the nine lessons of approximately 86 percent for teacher-led whole class instruction, 75 percent for student demonstration whole class instruction, and 93 percent for seatwork lesson situations. Attending-listening behaviors, as shown in Table 14, accounted for about 88 percent of all Mike's learning time in the mathematics

Table 12

Percentage Distributions of Student Overt Behaviors in Each Lesson Situation Category for Each Lesson : Mike

Categories of Student Overt Behaviors Within Lesson Situations	Lessons										Percentage Mean	Within-Category Sum of Percentage Means
	1	2	3	4	5	6	7	8	9	10		
Teacher-Led Whole Class Instruction												
Attending-listening	33.3	55.7	28.6	46.4	32.7	26.4	30.0		10.6	81.2	38.3	
Not attending-listening	--	8.2	5.4	--	--	1.9	20.0		--	18.7	6.0	
Interacting with other students	4.2	--	--	--	--	--	--		--	--	0.5	44.8
Out of desk	--	--	--	--	--	--	--		--	--	--	
Student Demonstration Whole Class Instruction								A				
Attending-listening	41.7	1.6	1.8	--	5.8	--	4.0	B	--	--	6.1	
Not attending-listening	4.2	--	1.8	--	--	--	12.0	S	--	--	2.0	
Interacting with other students	--	--	--	--	--	--	--	E	--	--	--	8.1
Out of desk	--	--	--	--	--	--	--	N	--	--	--	
Seatwork								T				
Attending-listening	16.7	26.2	57.1	39.3	59.6	71.7	34.0		89.4	--	43.8	
Not attending-listening	--	3.3	--	--	--	--	--		--	--	0.4	
Interacting with other students	--	4.9	--	--	--	--	--		--	--	0.5	47.1
Out of desk	--	--	5.4	14.3	--	--	--		--	--	2.2	
Supervised by teacher	--	--	--	--	1.9	--	--		--	--	0.2	

Table 13

Percentage Distributions of Means for Student Overt Behaviors Within Each Category of Lesson Situations : Mike

Categories of Lesson Situation	Categories of Overt Behavior	Within-Category Percentage Distributions of Means[a]
Teacher-led whole class instruction	Attending-listening	85.5
	Not attending-listening	13.4
	Interacting with other students	1.1
	Out of desk	--
Student demonstration whole class instruction	Attending-listening	75.3
	Not attending-listening	24.7
	Interacting with other students	--
	Out of desk	--
Seatwork	Attending-listening	93.0
	Not attending-listening	0.8
	Interacting with other students	1.1
	Out of desk	4.7
	Supervised by teacher	0.4

[a] Means for student overt behaviors derived from Table 12.

Table 14

Percentage Distributions of Student Overt Behaviors for Total Lesson Time : Mike

Categories of Student Overt Behaviors	Lessons										Percentage Mean
	1	2	3	4	5	6	7	8	9	10	
Attending-listening	91.6	83.6	87.5	85.7	98.1	98.1	68.0	ABSENT	100.0	81.2	88.2
Not attending-listening	4.2	11.5	7.1	--	--	1.9	32.0		--	18.7	8.4
Interacting with other students	4.2	4.9	--	--	--	--	--		--	--	1.0
Out of desk	--	--	5.4	14.3	--	--	--		--	--	2.2
Supervised by teacher	--	--	--	--	1.9	--	--		--	--	0.2

lessons.

Not-attending or listening behaviors accounted for most of the balance of learning time. While in seatwork, not attending-listening behaviors were virtually not observed; they were more prominent in the whole class lesson situations--13 percent for teacher-led and 25 percent for student demonstration. Overall, Mike was observed to be not attending-listening for about 8 percent of his learning time. Relatively few observations of Mike's overt behavior were recorded in the other categories of interacting with other students and out of desk.

A prominent feature of the quantitative analysis of Mike's overt behavior during most lessons was the high proportion of time spent attending or listening. Tables 12 and 14 indicate that lessons 2, 7, and 10 were days when Mike was coded as not attending or listening 11 percent, 32 percent, and 19 percent of the time, respectively. He was most likely to not attend or listen during teacher-led whole class instruction lesson situations.

Covert Behavior

In Table 15 the results of analyzing the percentage distribution of Mike's interactive thoughts across each of the nine lessons are presented. Most of the thoughts reported by Mike were those classified as cognitive processes, behavioral moves--self, behavioral moves--student, and self-performance--thoughts. Behavioral moves--teacher, non-task-related, feelings, and subject matter were categories of thoughts reported on an average of 5 to 10 percent of all thoughts. Relatively few thoughts in the category

Table 15

Percentage Distributions of Student Thoughts Over CASSIT Categories for Each Lesson : Mike

Categories of Student Covert Behavior	Lessons										Per-centage Mean
	1	2	3	4	5	6	7	8	9	10	
Subject Matter	9.1	7.7	13.6	--	9.1	9.4	4.5		--	--	5.9
Cognitive Processes	9.1	11.5	4.5	16.6	9.1	3.1	18.2		9.5	23.5	11.7
Behavioral Moves--Self	9.1	11.5	4.5	27.8	22.7	15.6	9.1	ABSENT	23.8	5.9	14.4
Behavioral Moves--Student	13.6	11.5	13.6	5.6	13.6	15.6	13.6		14.3	5.9	11.9
Behavioral Moves--Teacher	9.1	3.8	4.5	5.6	4.5	21.9	9.1		4.3	5.9	8.7
Self-Performance--Thoughts	22.7	38.5	36.4	33.3	31.8	25.0	27.3		23.8	41.2	31.1
Self-Performance--Feelings	--	--	--	--	--	--	--		4.7	17.6	2.5
Feelings	13.6	--	4.5	5.6	--	6.2	18.2		9.5	--	6.4
Non-Task-Related	13.6	15.4	18.2	5.6	9.1	3.1	--		--	--	7.2

of self-performance--feelings were reported.

For Mike nearly 18 percent of all thoughts were reported for the combined categories of subject matter and cognitive processes, which are the categories considered to be academically pertinent to the learning of mathematics. However, for purposes of this research, six other categories of thoughts were further analyzed. These categories were behavioral moves--self, behavioral moves--student, behavioral moves--teacher, self-performance--thoughts, self-performance--feelings, and feelings. The results of this more intensive analysis are presented in Table 16.

Behavioral moves--self. Table 16 shows that, of his behavioral moves, Mike's reported thoughts were frequently focused on attending-listening actions, including the motives for attending-listening. At no time did Mike express thoughts that he was not listening or attending which could be categorized as behavioral moves--self. A few interactive thoughts of seeking to participate publicly were reported by Mike.

Behavioral moves--student. The category of behavioral moves--student interactive thoughts accounted for nearly 12 percent of all Mike's reported thoughts. As Table 16 indicates, 56 percent of these thoughts were perceptions of other students' behavior and the balance were perceptions of other students' performances and inferences of other students' thoughts. These percentages indicated that Mike was aware of what other students were doing in the class and was concerned about their successes and failures and about what they

Table 16

Within-Category Percentage Distributions of Sub-categories of Selected Student Thought Categories of CASSIT : Mike

Sub-categories of Selected CASSIT Categories of Student Thoughts	Within-Category Percentage Distributions
Behavioral Moves--Self	
Seek public participation	7.14
Attending-listening	71.43
Motive to attend	21.43
Behavioral Moves--Student	
Perceptions of other students' performances	24.00
Inferences of other students' thoughts	20.00
Perceptions of other students' behavior	56.00
Behavioral Moves--Teacher	
Perceptions of teacher's instructional moves	42.11
Interactions	5.26
Perceptions of teacher's behavior	52.63
Self-Performance--Thoughts	
Self-assessment--success	16.13
Self-assessment--failure	8.06
Perceptions of task difficulty	27.42
Perceptions of task structure	25.81
Self-attributions	3.23
Self-expectations	14.52
Significant others	4.84
Self-Performance--Feelings	
Anxiety	25.00
Morally neutral--positive	25.00
Morally neutral--negative	50.00
Feelings	
Positive	92.31
Negative	7.69

were thinking.

Behavioral moves--teacher. Of all Mike's reported interactive thoughts nearly 9 percent involved behavioral moves--teacher. Table 16 shows that Mike was aware of what the teacher was doing and also reported thinking about the teacher's instructional moves.

Self-performance--thoughts. About 31 percent of all Mike's interactive thoughts were reported to be self-performance--thoughts. Of these, 16 percent were focused on successes and another 8 percent were focused on failures. Perceptions of tasks, in terms of difficulty and of structure, accounted for 53 percent of Mike's self-performance thoughts. Thoughts involving self-expectations accounted for another 14 percent of Mike's reported interactive covert behavior.

Self-performance--feelings. Very few expressions of self-performance--feelings were made by Mike. Of those reported, 75 percent occurred in the lesson during which the unit test results were announced. Because Mike was disappointed at his result, Table 16 presents a spuriously high percentage of morally neutral--negative feelings.

Feelings. The majority of Mike's feelings about the class in general were positive in nature. Emotions such as pleasure, amusement, pleasurable surprise, positive hopes, and being unworried characterized his covert behavior. The small percentage of negative feelings was directed solely to expressions of boredom.

Summary of Quantitative Analysis of Behavior

The quantitative analysis of Mike's behavior provided some descriptive trends in how he functioned during the learning of mathematics. Most of the time Mike was observed to be on-task in all lesson situations. This was concluded from an analysis of both Mike's overt and covert behavior. Not attending-listening behaviors mainly occurred during lesson situations which required him to watch or listen.

The majority of Mike's interactive thoughts focused upon the self, both in terms of his own performance and his behavior in the learning process. Most of his self-oriented thoughts referred to task-related matters of how he perceived the task and his attention to task. This pattern of covert behavior, together with the reasonably frequent occurrences of learning thoughts such as in the categories of cognitive processes and subject matter, supports the strong trend for on-task overt behavior. Self-assessment and self-expectation thoughts comprised a significant set of self-oriented thoughts which reflected a more personal aspect of behavior.

Other frequently occurring interactive thoughts which Mike reported included an awareness of what other students and the teacher were doing and thinking, how other students were performing, and mainly positive emotions about the classroom generally.

Attributional Analysis of Self-Performance
Covert Behavior

Causal Explanations of Mike's Behavior

The transcripts of the interviews with Mike contained several chains of comment which included causal explanations of behavior and causal perceptions of performance. In collating these chains of comments four clusters were discerned which referred to common cognitions, perceptions, and motives of behavior. These clusters were task perceptions and behaviors, specific performances, public participation, and perceptions of other students' behavior. Each cluster is described with examples and anecdotes included.

Task perceptions and behaviors. Mike often referred to the easy material which the class was required to learn. His commonly reported reason for finding the subject matter and learning tasks to be easy was that it tended to be review from Grade 5.

> I: How did you feel you got on with it?
> M: I thought it was pretty easy...yes, you know, it was pretty easy. I had done this last year. (Lesson 4)
>
> M: It was pretty easy.
> I: Why was it easy?
> M: Well, it's only review, like, well it is just a review of what we did this year [early half of 1978] and we did it last year too [1977]. (Lesson 5)

Mike expressed disappointment in lesson 4 that the unit topic was proving to be all review. He had expected to learn a great deal more new material in Grade 6. His justification for this was a preference to experience the challenge offered by new work and so that he could learn all that there was to be learned.

Consequent behaviors varied according to lesson situations. In addition to attending or listening during whole class instruction, Mike often occupied himself with other classroom assignments. During one mathematics lesson he wrote a story for language arts, on another occasion he completed a word search task for spelling, and during a third lesson completed all mathematics worksheet assignments set for the day when he was absent. While engaged in these off-task behaviors, Mike nevertheless kept an ear tuned to the teacher-led or student demonstration whole class instruction.

During seatwork, which normally involved completing worksheets, Mike endeavoured to finish the assignment quickly. He often went on ahead, not waiting for the teacher's directions or instructions.

> I: Okay Mike, as you first looked at the worksheet what were you thinking?
> M: Well, to try and get some things done in a hurry, to get a head start on them. (Lesson 2)

Mike's reasons for going ahead with the worksheet were that he understood what had to be done anyway and also that he might have some free time at the end in which he might do some reading. Because the worksheet material was perceived to be review, he expected to get the worksheet mainly correct, if not all correct.

One aspect of the worksheets did prove annoying to Mike. "I was thinking, like, in some of what we are asked to check, it is a lot easier to use...looking at it you can tell. Using a Plexiglas is quite bad" (Lesson 4). Where Mike perceived the answers in the worksheets on motion geometry to be self-evident from visual inspection he saw little point in going through the hassle of checking the work technically. His annoyance with this procedure led him to comment to the teacher in lesson 4 that the thickness of the Plexiglas induced errors anyway. In lesson 2 Mike found he could not achieve sufficient precision in his drawing so left that example and went on with the next. Having understood fully the central ideas and relationships, Mike was disinclined to allow mere technicalities to slow his progress.

Specific performances. Mike expected to succeed on all his mathematics worksheets and on the unit test.

> I: How well did you do [on a worksheet]?
> M: I got that one all correct.
> I: Can you remember your thoughts and feelings at that time when you looked at the sheet?
> M: I expected to get it all right. (Lesson 5)

With the worksheets he expected them to be easy because they were just review. He accepted that from time to time he might get one or two wrong but would only be surprised if he got many wrong.

> I: How would you feel then?
> M: I don't know.
> I: If you did get any wrong, what would you see as some reasons why you got it wrong?
> M: Well, I might have been rushing too much or never understood it. (Lesson 5)

Of interest in this hypothetical situation is Mike's attribution of failure to lack of effort.

The implications of Mike not knowing how he would feel if he failed underscore the typical level of achievement of this student. Yet Mike did not experience total success in the unit test.

> I: How did you get on in the test Mike?
> M: I had 87 percent.
> I: Were you surprised at that result?
> M: Yes. I was more or less. I thought it was a bad mark.
> I: What reasons would you give for not getting as good a

mark as you hoped for?
M: Maybe I was careless. (Lesson 10)

Mike explained that the mark was not too bad seeing as he had lost $4\frac{1}{2}$ marks on minor technicalities due to lack of precision. But he was disappointed that he had not scored higher.

I: What were your thoughts when you heard her announce your mark and you walked up to get it?
M: I was sort of disappointed that I only got 87. I was feeling bad.
I: But was it still a good mark?
M: To me it's not really a good mark. I am so used to higher marks, I guess. (Lesson 10)

Mike attributed his lower than expected performance to lack of effort, yet in a sense he also attributed the relative failure in part to the rigorous marking system.

> Each one was something small and it happened in a different part. I got four marks off for four different questions and then a half mark off for another one. As she said, the half marks added up...On one of them I forgot on the parallel lines, I got marked off 1 mark out of 2 marks because of no label.

The teacher's constant reminder of the need for precision and Mike's disinclination to concern himself with detail during the other learning sessions of the unit probably accounted for Mike's initial internal attribution of perceived failure. This reaction was also consistent with the earlier described hypothetical situation.

Public participation. Mike readily volunteered and frequently found he was called upon by the teacher to demonstrate an idea in front of the whole class or to answer a question during discussion. On most of these occasions Mike experienced no emotion, reporting that he was not really conscious of other students watching him.

I: When you are up at the front are you aware that all the kids are looking at you?
M: A little bit.
I: Does it worry you at all?
M: No.
I: Why do you think it doesn't worry you?
M: Well...I usually don't worry or get embarrassed. (Lesson 5)

Mike stated repeatedly that he did not worry about being in front of the class. He could not recall ever experiencing failure in that situation.

In general, Mike was not surprised to be picked by the teacher to contribute to the discussion or publicly demonstrate an idea.

I: Why do you think she picked you?
M: I don't know. Well, she might have thought I hadn't had a turn for a while or something like that.
I: Do you find that you often get called upon by her to answer questions?
M: Quite often.
I: Why do you think that is?
M: Well, I guess most people get called upon quite often when they put up their hand.
I: Do you think you get called on more than other people?
M: No. (Lesson 5)

These comments by Mike suggested he felt relaxed when contributing publicly to the lesson and apparently perceived his amount and kind of participation to be normal for class members.

Perceptions of other students' behavior. While being aware of other students' public contributions to the class, Mike seemed only slightly concerned about why they participated or how they performed. When Lisa was in front of the class demonstrating an idea, Mike commented:

M: I was thinking she probably couldn't do it, you know. Then she would get all embarrassed.
I: Okay.
M: I was just watching, 'cause I knew she couldn't do it anyway, so I started doing my story again. (Lesson 2)

On another occasion Mike pointed out that he sat up and took more notice when another student whom he perceived to be smart began challenging what appeared to be a fact. "He [the other student] usually picks out little mistakes. And he usually debates quite a bit" (Lesson 6). Mike did report that he knew most people's mannerisms and habits. During the unit test Mike hardly considered how other students were doing. He did make one comment: "Some people I think are uptight, you know!" (Lesson 9)

Mike's Basic Ideas and Beliefs

Self-expectations. Mike seemed to hold high performance expectations for himself in the learning of mathematics. This pervading notion was discerned across a variety of situations. When he first studied newly assigned worksheets, Mike expected to do well because he perceived them to be mainly review. Consequently, Mike nearly always "got it all correct" or close to being all correct.

During situations in which he participated publicly, Mike generally believed his contribution to be correct.

> I: What were you thinking?
> M: I was thinking about the math thing, you know, when she asked the question and it just came into mind, the answer.
> I: Then you put your hand up.
> M: Yes, 'cause I had it right. I was pretty sure I was. (Lesson 5)

Mike seldom experienced any form of failure in these situations and hence appeared at ease personally and always confident that he understood clearly the subject matter being learned.

In terms of the unit test, Mike also expected to do well and believed he would feel "pretty good about this."

I: How do you expect you will get on in the test?
M. I think I'll probably get on pretty good.
I: What do you mean by pretty good?
M: Well I might get it all right or nearly all correct. It's hard to tell.
I: Have you ever got all correct?
M: Yes, quite often. (Lesson 8)

In an earlier lesson Mike commented in a similar way about the upcoming unit test, noting that the test would be easy because it was mainly review. However, Mike also added a further reason for the expected success: "Well, I guess I usually do good in most things at school on math or so" (Lesson 6).

The comment regarding Mike's perception of his own ability was supported by another statement from the pre-test interview. In response to the question, "Do you think they [the other students] wonder how well you are doing?", Mike replied.

> Maybe. I sometimes think that they might very well find me better than anyone else, something like that. I sometimes get the thought.

A clear indication of Mike's self-expectations was revealed in comments when the teacher was discussing the distribution of test scores prior to handing back the tests. Mark expected to be at the top--he had no expectations at all for being below half marks: "I was wondering what I got. I sort of felt that I might be one of the best in the class."

Mike also volunteered the information that the previous year the Grade 5 students were streamed for mathematics and that he was in the top maths group. The direct evidence and interpretations of a variety of his comments lend support to the conclusion that Mike believed he expected to do well because he perceived himself as a student of higher ability. Ease of task probably served to reinforce the high self-expectations.

Mike's perceptions of the teacher's performance expectations of himself. While Mike often referred to his high performance self-expectations in mathematics, he rarely expressed comment as to how he thought the teacher perceived him. During the interviews involving the unit test, Mike did comment:

> M: I don't think she would be surprised if I got it nearly all or all correct. I think she would be surprised if I did real bad.
> I: Why do you think she would be surprised if you did real bad?
> M: Well, in most of the worksheets I did pretty good. (Lesson 8)

Following the announcement of the test results Mike felt that the teacher wouldn't be too surprised with his lower than expected score. Mike believed the teacher's thoughts about him in mathematics more or less matched his own thoughts of his performance. The inference is drawn that, because Mike perceived himself to be a student of higher or above average performance, he believed the teacher perceived him in a similar manner.

Perceptions of other students' performances. Mike seemed to perceive clearly the achievement hierarchy of students in the classroom. When asked how would he know who were the top five or six students in mathematics, Mike commented:

> Well they sort of seem to always know what's happening and whenever they are asked a question they get it right or at least mostly, you know. And they can explain things you know. And some of them like, have been in my math class for a couple of years so I know. (Lesson 5)

He perceived that students who were not sure about the work tried not to get asked questions so these students would be the lower students. As well, Mike reported noticing that the teacher supervised some students more than others because they were people whom the teacher thought might have had more problems.

Mike was able to determine how other students performed in the unit test by means of the teacher's discussion about the distribution of marks. However, he was basically unconcerned with the performances of other students, except to note that his mark was well above the average. Mike seemed to hold no negative attitude towards students of lower ability than himself. Likewise, he was noncommittal towards the teacher recognizing publicly those students who had performed well in the test. While this may reflect Mike's lower than expected score, it was also consistent with a wider attitude of lack of real concern or interest in how other students performed. He did express disappointment when he realized another student had gained the top mark in the unit test, but only because it deprived him from achieving that success.

Perceptions of tasks and activities. Mike held differential views regarding the most important facets of lessons:

> Well, if it is new stuff then you listen to the teacher so that you can get your worksheet right. If it's review, doing the worksheet is the most important. (Lesson 8)

Throughout the lesson series he would have preferred new work for the challenge it offers. When asked as to what was the most important thing in mathematics, Mike replied, "Learning new stuff."

In terms of difficulty level of worksheets, Mike preferred those which contained some exercises which caused him to struggle, yet which he was able to manage all right. However, if only a short period of work time was available, Mike preferred easy worksheets:

> If we don't have all that much time we usually like an easy worksheet, but usually we like it half and half....Sometimes I like doing a hard one, you know, like star questions or think questions. I sort of like doing those ones. (Lesson 7)

The importance of the unit test was emphasized by Mike.

> I: Do you see the end-of-unit test as an important thing?
> M: Yes. I think so, especially since the report cards are based on that. (Lesson 7)

When asked during the pre-test interview if he cared about tests, Mike reiterated the same point:

> Because, you know, if I don't care, I'll just do all the answers without thinking. Like, you know, it will reflect on my report card, and I don't want that. (Lesson 8)

The report card featured as one underlying motive in Mike's behavior and performance in the classroom and a good performance on the unit test was perceived as the necessary component. Mike stated in lesson 7 that the lesson situation of listening counted most toward doing well on the unit test because worksheets were viewed mainly as review.

A Characterization of Mike's Conception of Self-Performance

Mike was selected for study because he was judged to be a successful student. A characterization of his conception of self-performance was interpreted from the available evidence. The major elements of this characterization were:

1. Mike's approach to learning can be described as mastery-oriented. Success was always perceived by Mike to be obtainable through a combination of ability and effort. His

self-perception of higher ability seemed to be the major factor underlying his high performance self-expectations. Any partial failure was readily accounted for by insufficient effort.

2. Mike perceived all subject matter and lesson tasks to be of a low level of difficulty. He understood all concepts and all operations in the unit topic being studied and attributed this clear perception of task structure mainly to review.
3. Mike revealed few emotional reactions to his performance. Successes were viewed as inevitable confirmations of his self-expectations. Where his performance fell short of his expectations, Mike tended to experience morally neutral feelings of disappointment, but these were of temporary duration and of shallow intensity. No evidence was available as to the kind of feelings Mike would experience if he ever performed poorly.
4. Mike readily volunteered to participate publicly. When in front of the class Mike experienced little or no emotion, always appearing relaxed. He expected to succeed and his behavior reflected his high degree of self-confidence.
5. Mike tended to be unconcerned with the motives and behaviors of other students, yet he was aware of what they were doing.
6. Mike perceived clearly the classroom achievement hierarchy in relation to himself. He perceived himself to be one of the best students in the class and he considered other students shared this point of view of his performance. Mike

judged the other students' relative positions by how they behaved and performed during the learning situation.

7. Mike believed the teacher held higher performance expectations for him.
8. Mike perceived as an important goal of classroom performance the gaining of a good mark on his report card. Because he held high self-expectations based on his self-perceived higher ability and because Mike perceived the teacher held higher performance expectations of him, Mike readily believed he would achieve a good mark on his report. Mike did not expect to fail. He possessed a high degree of self-esteem based mainly on his successful behavior and performance in learning mathematics. Mike's perceptions that his peers acknowledged his ability contributed to his high level of self-esteem.

Analysis of the Dyadic Interactions Between Mike and the Teacher

Analysis of the Overt Behaviors

The results of the analysis of the interaction sequences between Mike and the teacher are presented in Table 17 and in Figures 9 and 10. Table 17 shows that Mike and the teacher interacted dyadically 13 times during the nine mathematics lessons. Approximately half of the interactions were teacher-initiated and public, while most of the balance were student-initiated private interactions. These student-initiated private interactions occupied a total duration time of 102 seconds, although one such interaction of 55 seconds pertained to a non-mathematical concern.

Table 17

Frequency Distribution of Dyadic Interactions Between Mike and Teacher

Type of Interaction	Lessons										Total
	1	2	3	4	5	6	7	8	9	10	
Teacher initiated public interaction	1	-	1	-	2	1	2	ABSENT	-	-	7
Student initiated public interaction	-	-	-	-	-	-	-		-	1	1
Teacher initiated private interaction	-	-	-	-	-	-	-		-	-	-
Student initiated private interaction[a]	-	-	2	1	1	-	-		1	-	5
Total:	1	-	3	1	3	1	2		1	1	13

[a] Duration of the student initiated private interactions was 3, 22, 20, 55, and 2 seconds, respectively, for a total time of 102 seconds.

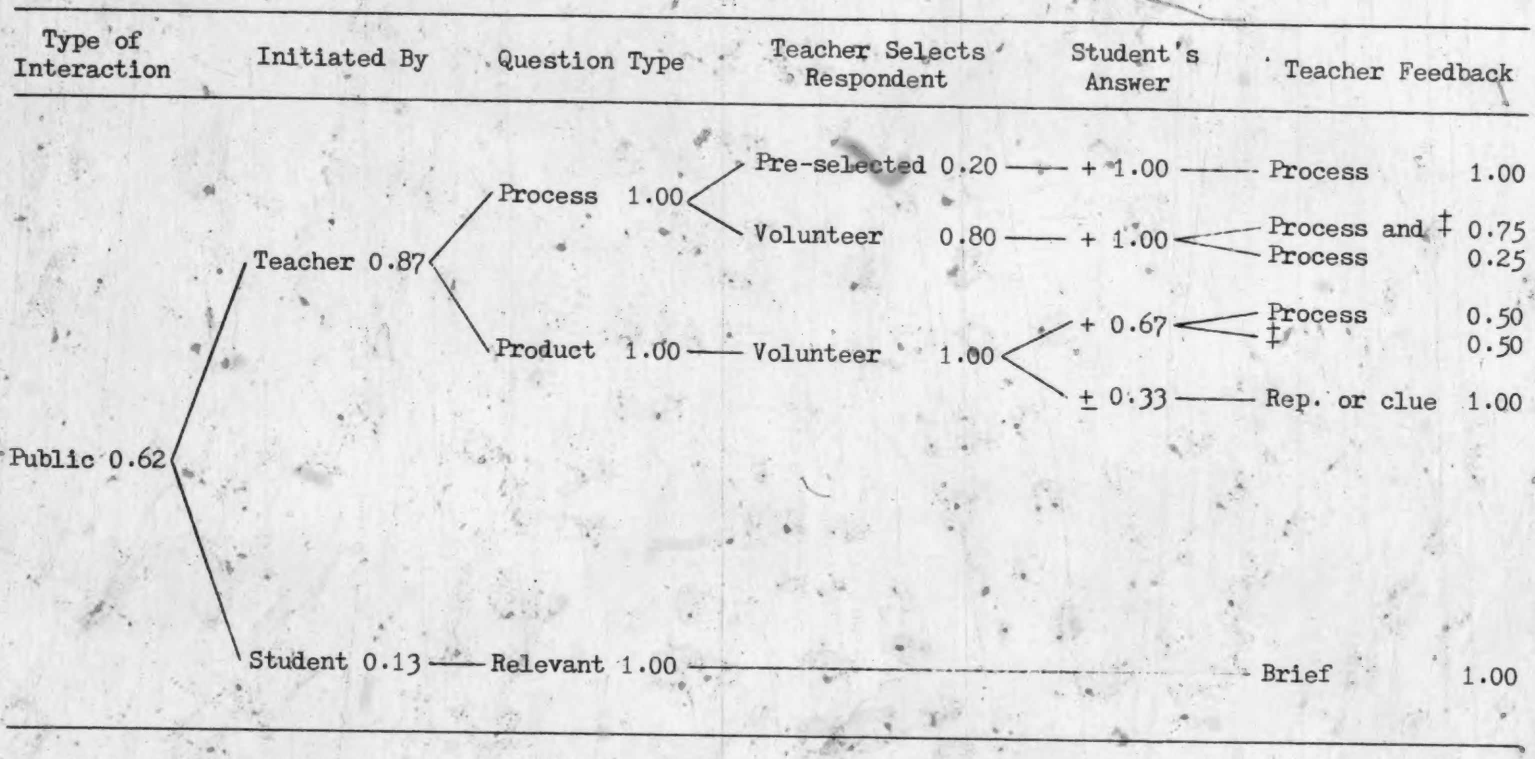

Type of Interaction
Initiated By
Question Type
Teacher Selects Respondent
Student's Answer
Teacher Feedback
Public 0.62
Teacher 0.87
Student 0.13
Process 1.00
Product 1.00
Relevant 1.00
Pre-selected 0.20
Volunteer 0.80
Volunteer 1.00
+ 1.00
+ 1.00
+ 0.67
± 0.33
Process 1.00
Process and ‡ 0.75
Process 0.25
Process 0.50
‡ 0.50
Rep. or clue 1.00
Brief 1.00

Figure 9. Nature of Public Dyadic Interactions Between Mike and Teacher and Their Proportions

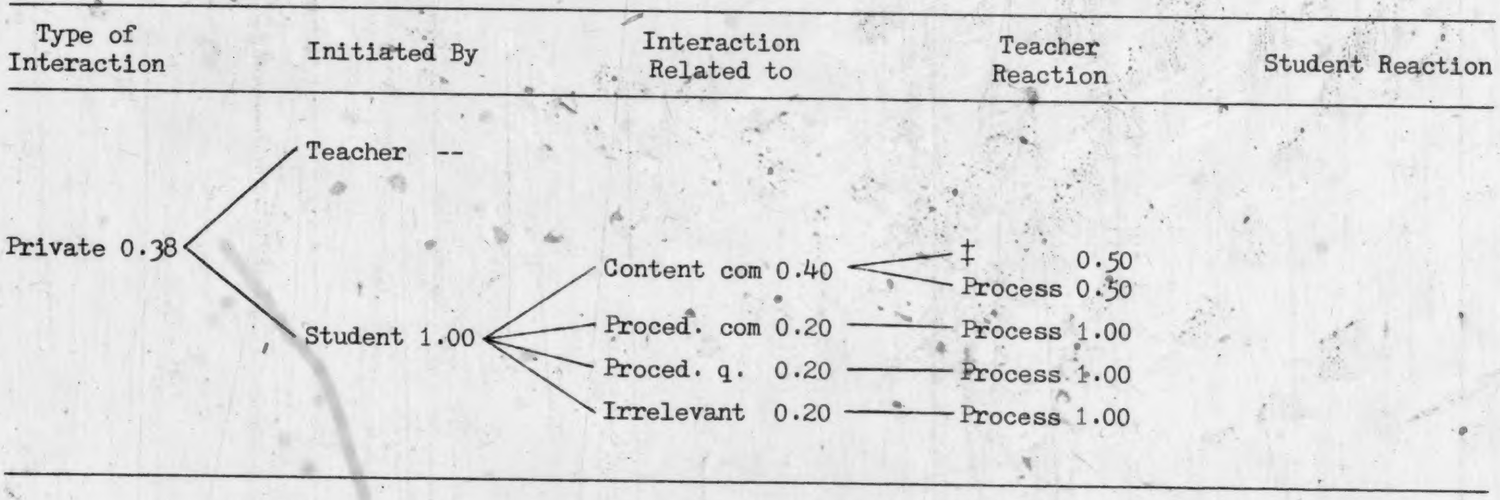

Type of Interaction
Initiated By
Interaction Related to
Teacher Reaction
Student Reaction
Private 0.38
Teacher --
Student 1.00
Content com 0.40
Proced. com 0.20
Proced. q. 0.20
Irrelevant 0.20
‡ 0.50
Process 0.50
Process 1.00
Process 1.00
Process 1.00

Figure 10. Nature of Private Dyadic Interactions Between Mike and Teacher and Their Proportions

Figure 9 indicates that in the seven teacher-initiated public interactions Mike volunteered on most occasions to respond, that he answered correctly the process questions and that the teacher tended to give process feedback by repeating Mike's response and outlining the reasoning he used to arrive at that response. In four of the seven interactions the teacher incorporated praise in her reaction to Mike's answers. On the one occasion that Mike was initially judged to respond in a partially correct manner the teacher provided a brief clue which enabled Mike to arrive at the answer.

The private dyadic interactions as shown in Figure 10 were all student-initiated, to which the teacher responded in an extended manner in three of the five interactions. A substantive analysis of these three interactions revealed that each concerned trivial aspects of the learning involved and not one dealt with subject matter content information. Overall, the quality of private dyadic interactions was characterized by non-significant issues, and by brief and neutral communications.

The Overall Analysis of the Dyadic Interactions

Some of the dyadic interactions between Mike and the teacher were analyzed by an overall examination of the observable data, the teacher's covert behavior, and the student's covert behavior. However, the number of interactions was very small and, consequently, the items of data described were only samples of actual behavior. They may not constitute generalizations of phenomena prevailing whenever Mike and the teacher interacted dyadically.

In lesson 1 Mike had volunteered to demonstrate an idea on the blackboard in front of the class. The teacher commented that she was concerned that previous attempts to explain the idea had proved misleading or had sidetracked the discussion.

> Teacher: Now when a child doesn't answer what you expect, you have to suddenly make a snap decision as to what direction your lesson is going to go from there. I knew that our time was running, and I said I hope Mike does do it...that there are no mistakes...that he does the method that I was thinking of.
>
> I: Was that one of the reasons why you called Mike up in that case?
>
> Teacher: Probably yes. I know that sometimes I do that. When I ask a question you can read the answer in the child's face and you know that they understand or not. I probably did call Mike up at this point to say... let's move along...we've got to get on with the worksheet. (Lesson 1)

Mike viewed the episode in a routine manner. His thoughts were on the question at hand and he saw no particular reason why he was picked and not someone else. He expected to demonstrate the point correctly and commented as he returned to his desk, "I knew that I had done it right." Mike further recalled that as he returned to his desk he was watching a desk dispute between two boys and that his mind was not really focused on the teacher's discussion of his demonstration to the whole class.

Earlier in the same episode a student perceived by the teacher to be less successful had demonstrated what seemed to be an ingenious idea.

> Teacher: I was actually surprised...coming from Clare. Now if Duncan or Mike or someone like that had come up and done it, I would have thought "Yes" because they are the ones you sort of think of as "quick thinking."

The evidence provides further confirmation of the teacher's perceptions of Mike as a successful student and that this success is attributed to his ability.

Some interactions involved trivial concerns of Mike. While they reflected an intellectually stimulated mind they nevertheless were viewed as probably unnecessary.

> Teacher: I was aware of Mike behind me [while working with another student] at this point and I was thinking, "Is it going to be another one of yesterday's comments?" [an earlier innane comment].
> I gave him a funny look when I stood up and I looked at him. You know, "What is it now?"
> He noticed the thickness of the Plexiglas and compared it to the thickness of the line and he was saying it may create error...At least it was a bit more of an intelligent comment.

On another occasion during the learning of mathematics Mike was particularly concerned with the number of library books he had read in a period of time and felt that the number had been incorrectly recorded. While the teacher acknowledged Mike had completed his work, she was concerned that this reflected an off-task behavior which probably conflicted with her expectation of Mike. Mike, meanwhile, had expressed concern with the inaccurate recording of books read as early as the first five minutes of the lesson. The dyadic interaction involved a total of 55 seconds of time.

A plausible interpretation of the evidence presented suggests that the teacher held higher performance expectations for Mike. Mike was one of the students used by the teacher when she wanted to change the pace of the lesson or redirect the discussion along pre-planned lines. The teacher felt sufficiently assured of Mike's understanding and contribution to the class to call upon him whenever she posed process questions involving higher order thinking. She tended to provide praise in her feedback to Mike as well as integrating his correct responses into the overall discussion. Mike was aware that the teacher held higher performance expectations of him but little or no evidence was available to suggest he manipulated situations to enhance the expectations held.

Summary Analysis

The results of describing Mike's achievement-related behavior during the learning of mathematics have established some relationships among and between aspects of his thoughts and his behavior:

1. Mike held high performance self-expectations which included gaining a good mark on the report form.
2. His expected success was perceived by Mike to be based on higher ability.
3. Mike perceived the teacher and other students held higher performance expectations of him.
4. Mike perceived these teacher and other students' performance expectations were based on causal perceptions of higher ability.
5. Mike was perceived by the teacher as a student who was mainly on-task.
6. The teacher held higher performance expectations for Mike.
7. The teacher's causal perception of Mike's success was mainly to ability and to some effort.
8. The teacher appeared to communicate these expectations through interaction process behaviors such as selective use of Mike's

volunteered responses to pace the lesson, by selective use of Mike to respond to higher order questions, and by the use of praise when giving feedback to Mike's correct responses.

9. Mike performed successfully in all lesson situations, reflecting his mastery-oriented approach to learning. He hardly knew failure other than those accredited to minor lapses in effort.
10. Mike's successful performance served to sustain the high performance expectations held for him by the self, the teacher, and the other students.

A Summary Comparison of Tina and Mike

This chapter has described the achievement-related behavior of two "successful" students, Tina and Mike. Both students were observed to be on-task most of the time, especially during seatwork. Not attending-listening behaviors were more likely to be coded during teacher-led and student demonstration whole class instruction. In quantitative terms, the interactive covert behavior of the two students was similar in pattern except for one basic difference. Mike's thoughts tended to be more content or task-oriented than Tina's, while Tina's thoughts tended to be more self-oriented than Mike's.

Tina and Mike subscribed mutually to the importance of the report card grade, their approaches to learning were mastery-oriented, and their performance self-expectations were perceived by them to be higher or above average. They usually experienced success with positive affective consequences. However, where Mike attributed his success largely to ability, Tina attributed her success largely to effort. As a consequence, Mike seemed uninvolved emotionally and unconcerned about his public image, which reflected his task-oriented self-conception. In contrast, Tina was concerned about her public image, hence her self-conception seemed to involve more personal elements.

Both Tina and Mike seemed aware that the teacher held higher performance expectations toward them, as conveyed by some of the teacher's instructional moves. Tina perceived the teacher's higher performance expectations were effort-based and hence she sought to maintain or enhance this image. Mike perceived the teacher's higher performance expectations of him were ability-based. The teacher was viewed by both students as espousing effort as the criterion of success.

P

Chapter VI

CASE STUDIES : LISA AND GREG

LISA

Biographical Information

Lisa was the youngest of three girls in her family. Both of her older sisters were teenagers attending junior high school and senior high school, respectively. The father was not living with the family in their home in the neighborhood of the school. Lisa had lived much of her early life in a northern Alberta community before the family moved to their present urban home.

Lisa was aged 11 years and reported swimming and running to be her main interests. She enjoyed watching television, especially "Bewitched" and sometimes the news. Her travel experience extended as far as Vancouver and northern Alberta.

Lisa stated reading, spelling, and language arts in general to be her best subjects. In terms of maths, she reported being in the bottom class in Grade 5 where the classes were streamed for that subject area. Lisa had one close friend in the classroom. Her involvement in school life included being a traffic patrol warden, a library helper, and a helping hand in a lower grade classroom during after-school hours. When asked as to why she came to school, Lisa replied, "To learn. The teachers can explain it better than anyone at home."

The teacher viewed Lisa as a student whose ability was slightly below average. The teacher detected early in the year Lisa's problem with processing new information: "I noticed several times, something I have just gone over and over and over, she'll ask a question about, as if she hasn't heard anything." On examining Lisa's cumulative record, the teacher found that the problem had been investigated and was a factor to be considered by the teacher when working with Lisa.

The school's cumulative records showed that in Grade 5 Lisa had gained an achievement percentile of 5 in mathematics. This represented a low achieving student. Her PAPS total expectation score of 100 was the lowest recorded in the class and reflected a low degree of expectancy of success in performance across most school subjects. Her mathematics sub-score of 17 out of 28 indicated that her expectations for that subject area were correspondingly low. Examination of Lisa's responses in mathematics showed that she expected to learn only some of what would be taught, expected that most other kids would be better than her, and expected to like math a little.

Lisa's self-reporting of internal responsibility for success or failure on the IAR revealed that she attributed 24 of the 34 situations to internal causes and 10 to external causes. Because her internal responsibility for success score of 13 was close to being equivalent to her internal responsibility for failure score of 11, it can be concluded that Lisa assumed credit for causing good things to happen in much the same way as she accepted blame for unpleasant consequences. Examination of her responses tended to support this conclusion.

Quantitative Analysis of Behavior

Lisa's behavior during the learning of mathematics was analyzed quantitatively according to both the overt and covert aspects.

Overt Behavior

Tables 18, 19, and 20 present the results of the analysis of Lisa's overt behavior. Table 18 indicates that the majority of Lisa's time was spent in the lesson situations of teacher-led whole class instruction and of seatwork, which accounted for approximately 48 percent and 44 percent, respectively, of the learning time. For most of the learning time Lisa was observed to be attending-listening. Table 19 shows that across the three categories of lesson situations Lisa was observed to be on-task for approximately 90 percent of teacher-led whole class instruction, 97 percent of student demonstration whole class instruction, and 77 percent of the seatwork learning time. Attending-listening behaviors, as shown in Table 20, accounted for about 85 percent of all Lisa's learning time in the mathematics lessons.

Not attending-listening behaviors were observed to account for a very small proportion of Lisa's learning time. Table 20 indicates that these behaviors accounted for barely 3 percent of the

Table 18

Percentage Distributions of Student Overt Behaviors in Each Lesson Situation Category for Each Lesson : Lisa

Categories of Student Overt Behaviors Within Lesson Situations	Lessons										Percentage Mean	Within-Category Sum of Percentage Means
	1	2	3	4	5	6	7	8	9	10		
Teacher-Led Whole Class Instruction												
Attending-listening	40.0	58.3	31.4	44.8	32.6	25.0	46.0	61.0	8.7	87.5	43.5	48.4
Not attending-listening	--	--	5.9	--	--	1.9	4.0	4.9	--	3.1	2.0	
Interacting with other students	--	1.7	--	3.4	--	1.9	--	2.4	--	9.4	1.9	
Out of desk	--	5.1	--	--	2.8	--	--	--	2.2	--	1.0	
Student Demonstration Whole Class Instruction												
Attending-listening	44.0	1.7	3.9	--	6.1	--	14.0	4.9	--	--	7.5	7.7
Not attending-listening	--	--	--	--	--	--	2.0	--	--	--	0.2	
Interacting with other students	--	--	--	--	--	--	--	--	--	--	--	
Out of desk	--	--	--	--	--	--	--	--	--	--	--	
Seatwork												
Attending-listening	12.0	13.3	47.1	41.4	44.0	53.8	30.0	14.6	82.6	--	33.9	43.9
Not attending-listening	--	--	--	--	--	1.9	--	--	6.5	--	0.8	
Interacting with other students	--	11.7	5.9	6.9	6.1	3.8	4.0	7.3	--	--	4.6	
Out of desk	--	1.7	2.0	--	8.3	--	--	2.4	--	--	1.4	
Supervised by teacher	4.0	6.7	3.9	3.4	--	11.5	--	2.4	--	--	3.2	

Table 19

Percentage Distributions of Means for Student Overt Behaviors
Within Each Category of Lesson Situations : Lisa

Categories of Lesson Situation	Categories of Overt Behavior	Within-Category Percentage Distributions of Means[a]
Teacher-led whole class instruction	Attending-listening	89.9
	Not attending-listening	4.1
	Interacting with other students	3.9
	Out of desk	2.0
Student demonstration whole class instruction	Attending-listening	97.4
	Not attending-listening	2.6
	Interacting with other students	--
	Out of desk	--
Seatwork	Attending-listening	77.2
	Not attending-listening	1.8
	Interacting with other students	10.5
	Out of desk	3.2
	Supervised by teacher	7.3

[a] Means for student overt behaviors derived from Table 18.

Table 20

Percentage Distributions of Student Overt Behaviors
for Total Lesson Time : Lisa

Categories of Student Overt Behaviors	Lessons										Percentage Mean
	1	2	3	4	5	6	7	8	9	10	
Attending-listening	96.0	73.3	82.3	86.2	82.8	78.8	90.0	80.5	91.3	87.5	84.9
Not attending-listening	--	--	5.9	--	--	3.8	6.0	4.9	6.5	3.1	3.0
Interacting with other students	--	13.3	5.9	10.3	6.1	5.8	4.0	9.8	--	9.4	6.5
Out of desk	--	6.7	2.0	--	11.1	--	--	2.4	2.2	--	2.4
Supervised by teacher	4.0	6.7	3.9	3.4	--	11.5	--	2.4	--	--	3.2

lesson time. Not attending-listening behaviors were not observed in 4 of the 10 lessons.

A noticeable proportion of the learning time when Lisa was recorded as not being on-task was absorbed by Lisa interacting with other students, especially during seatwork. Table 20 reveals that more than 6 percent of Lisa's overt behaviors were coded as interacting with other students, with the seatwork lesson situation accounting for more than two-thirds of that percentage distribution. As Table 19 shows, interacting with other students was coded 10 percent of Lisa's seatwork behaviors. She was being supervised by the teacher for another 7 percent of her seatwork time. Out of desk behaviors were observed to occur infrequently.

While Lisa was recorded as being on-task most of the time, Table 18 shows that lessons 2 and 8 were days on which Lisa's time during seatwork was divided significantly between on-task and other behaviors. In lesson 2 seatwork, Lisa was on-task 13 percent of the total lesson time and engaged in other behaviors about 19 percent of the total lesson time. The percentage distributions for on-task and for other behaviors during seatwork in lesson 8 were 15 percent and 12 percent, respectively, of the total lesson time. Seatwork appeared to be the lesson situation in which Lisa was most likely to be engaged in behaviors other than attending-listening.

Covert Behavior

The percentage distributions of Lisa's interactive thoughts across 11 lessons are presented in Table 21. Because the final rehearsal lesson contained valuable information about Lisa's

Table 21

Percentage Distributions of Student Thoughts Over CASSIT Categories for Each Lesson : Lisa

Categories of Student Covert Behavior	Lessons											Percentage Mean
	R	1	2	3	4	5	6	7	8	9	10	
Subject Matter	--	6.4	2.8	--	--	7.7	--	4.2	8.3	--	--	2.7
Cognitive Processes	12.5	6.4	8.3	12.5	11.8	12.8	4.8	8.3	--	--	--	7.0
Behavioral Moves--Self	20.0	25.8	13.9	37.5	23.5	25.6	28.6	20.8	16.7	31.2	11.8	23.2
Behavioral Moves--Student	10.0	9.7	8.3	12.5	11.8	2.6	9.5	8.3	8.3	6.2	11.8	9.0
Behavioral Moves--Teacher	7.5	--	5.6	--	11.8	5.1	9.5	--	8.3	--	20.6	6.2
Self-Performance--Thoughts	27.5	22.6	27.8	29.2	29.4	25.6	33.3	20.8	16.7	37.5	23.5	26.7
Self-Performance--Feelings	10.0	--	13.9	--	5.9	10.3	--	12.5	8.3	6.2	26.5	8.5
Feelings	10.0	22.6	11.1	8.3	--	7.7	4.8	12.5	8.3	18.7	5.9	10.0
Non-Task-Related	2.5	6.4	8.3	--	5.8	2.6	9.5	12.5	25.0	--	--	6.6

conception of self-performance, the data from the lesson were also analyzed. About half of Lisa's reported thoughts pertained to self-oriented aspects. An average of about 27 percent of all thoughts across all lessons were categorized as self-performance--thoughts, while 23 percent were coded as behavioral moves--self. The self-focused character of Lisa's covert behavior during learning was more pronounced with the inclusion of self-performance--feelings; these accounted for another 8.5 percent of all thoughts.

Lisa's feelings about classroom matters in general were reported frequently and averaged 10 percent of her interactive covert behavior. Another 9 percent of Lisa's thoughts were oriented toward behavioral moves of other students. The categories of cognitive processes, behavioral moves--teacher, and non-task-related thoughts each contained between 5 to 10 percent of Lisa's reported thoughts, while she made very little reference to subject matter thoughts when learning mathematics.

Six of the categories of interactive thoughts were subcategorized in order to further analyze those thought units which were presumed to pertain to Lisa's conception of self-performance. Those categories were behavioral moves--self, behavioral moves--student, behavioral moves--teacher, self-performance--thoughts, self-performance--feelings, and feelings. Table 22 presents the results of the more intensive analysis.

Behavioral moves--self. As Table 22 indicates, over half of Lisa's thoughts coded as behavioral moves--self were concerned with attending-listening and with the motive to attend. This finding

Table 22

Within-Category Percentage Distributions of
Sub-categories of Selected Student
Thought Categories of CASSIT : Lisa

Sub-categories of Selected CASSIT Categories of Student Thoughts	Within-Category Percentage Distributions
Behavioral Moves--Self	
Seek public participation	7.46
Avoid public participation	19.40
Attending-listening	38.80
Motive to attend	14.93
Motive to avoid attending	11.94
Pretending to attend	7.46
Behavioral Moves--Student	
Perceptions of other students' performances	32.14
Inferences of other students' thoughts	10.71
Interactions	25.00
Perceptions of other students' behavior	32.14
Behavioral Moves--Teacher	
Perceptions of teacher's instructional moves	5.26
Interactions	52.63
Perceptions of teacher's behavior	42.11
Self-Performance--Thoughts	
Self-assessment--success	14.10
Self-assessment--failure	25.64
Perceptions of task difficulty	7.69
Perceptions of task structure	21.79
Self-attributions	3.85
Self-expectations	10.26
Significant others	16.67
Self-Performance--Feelings	
Anxiety	39.29
Morally neutral--positive	17.86
Morally neutral--negative	35.71
Morally unneutral--positive	3.57
Morally unneutral--negative	3.57
Feelings	
Positive	43.33
Negative	56.67

supports the trend noted in the analysis of her overt behavior. However, a trend not discerned in the overt analysis was the 19 percent of thoughts which were concerned with motives to avoid attending and pretending to attend. Table 22 suggests that Lisa's thoughts about volunteering or contributing publicly in the class were more often oriented toward avoiding participation than seeking participation.

Behavioral moves--student. Table 22 shows that Lisa was aware of what other students were doing and how well they were performing. Both sub-categories contained about 32 percent of Lisa's behavioral moves--student thoughts. The overt analysis had indicated that Lisa spent a significant amount of her seatwork interacting with other students and this is matched by the 25 percent of Lisa's behavioral moves--student thoughts which were concerned with interactions. Only rarely did Lisa report thinking about what other students were thinking.

Behavioral moves--teacher. Of the small percentage of Lisa's interactive thoughts which she reported about the behavior and actions of the teacher, most were concerned with the interactions which she shared with the teacher. However, as Table 22 also shows, Lisa was aware of what the teacher was doing. Examination of this sub-category of Lisa's thoughts revealed that approximately half were perceptions of how the teacher would react if Lisa initiated an interaction for a particular reason.

Self-performance--thoughts. Table 22 indicates that most of Lisa's self-performance--thoughts during the learning of mathematics were concerned with self-assessment. Of the nearly 40 percent of all thoughts in this category, 26 percent referred to failure and 14 percent referred to success. Also very much on Lisa's mind were perceptions of task structure which accounted for another 22 percent of thoughts in this category. Lisa also appeared to give consideration to significant others, a sub-category which was coded 17 percent of all self-performance--thoughts. A further 10 percent of these thoughts referred to Lisa's self-expectations. Examination of the transcripts containing the data used in this analysis showed a generally negative trend prevailing in most sub-categories of Lisa's self-performance--thoughts.

Self-performance--feelings. Most of Lisa's self-performance--feelings contained negative elements. Table 22 reveals that 39 percent of all her expressions of emotions reflected anxiety such as fright and worry, 36 percent reflected morally neutral--negative feelings such as disappointment and despair, and 3.5 percent reflected morally unneutral--negative feelings such as jealousy. Of the remaining 21 percent of self-performance--feelings expressed, most referred to morally neutral--positive emotions such as pleasure and hoping for success.

Feelings. Table 22 shows that more expressions of negative affect were reported by Lisa than positive affect. Negative feelings expressed included anger, boredom, disappointment, dislike, envy, embarrassment, and fear. Of the positive emotions expressed, amusement, excitement, pleasure, and pride were most often reported.

Summary of Quantitative Analysis of Behavior

Some patterns in Lisa's behavior can be discerned from a quantitative analysis of the available data. At the overt level, Lisa was observed to be a student who was on-task for the whole class instructional situations and mainly on-task during seatwork. The covert analysis would seem to suggest, however, that Lisa was viewing instructional events through a screen of largely negative thoughts and feelings.

Elements of this negative learning screen identified from the quantitative analysis of Lisa's behavior included trends for avoidance of public participation, some intentions for not attending-listening, self-assessments of failure, perceptions that success or failure on tasks was more likely to be controlled by external factors than by her own level of competence, awareness of the influences of other people on her performance, and a collation of emotions considered generally to suppress learning effectiveness. The majority of Lisa's interactive thoughts, therefore, were self-oriented, both in terms of her own performance and her behavior in the learning process.

Attributional Analysis of Self-Performance Covert Behavior

Causal Explanations of Lisa's Behavior

Numerous chains of comment which included causal explanations of behavior and causal perceptions of performance were discerned in the transcripts of the interviews with Lisa. Five main clusters of these chains of comments reported by Lisa were approach to learning, perceptions of tasks and behaviors, specific performances, public participation, and perceptions of other students' behavior. Each cluster is described, with examples and anecdotes included. "Lesson R" after some examples pertains to the final rehearsal lesson.

Approach to learning.

I: How did you feel at that time?
L: I just didn't know what it was and I was just going to stay there. I was frightened because I thought if she [the teacher] asks me I didn't know what it was.
I: Why would that frighten you?
L: Because everybody else has their hand up, they knew the answer and I didn't.
I: You would feel bad?
L: Yes, because of what the other kids might think about me. (Lesson R)

This sample of a chain of comments illustrates the kind of thoughts which pervaded Lisa's mind during the learning of mathematics. She frequently made reference to the cognition that she did not understand the material to be learned. In most cases this cognition was accompanied by a negative emotion. Very often the cause of this emotional accompaniment of the initial cognition was perceived by Lisa to be what other students and the teacher might think of her if and when they became aware of her failure.

L: I thought I would get worried if I had to do a worksheet on it.
I: Yes...
L: Get all confused...
I: Why would you get worried if you had to do a worksheet?
L: Because I wouldn't want to do it and I would be scared to ask the teacher because then she would think that I wasn't listening.
I: What happens when you are worried like that?
L: I'll ask other kids. I ask Andrew. (Lesson R)

Lisa's plight was even more sharply exposed in comments such as the following:

> I was stuck on one question, but I asked Clare, 'cause I didn't want to bother the teacher. I thought maybe she [the teacher] would think I was dumb because I didn't get it. (Lesson 2)

These samples of several similar reports of Lisa's covert behavior illustrate her reactions to failure. They also suggest that Lisa attributed her failure to a combination of lack of ability and lack of effort. Her approach to learning, therefore, appeared to contain a number of the characteristics of learned helplessness. The frequent comments such as "I don't understand it" or "I needed help" implied that Lisa perceived success or failure on tasks to be more likely controlled by external factors than by her own level of competence or her input of effort.

The helpless approach to learning was observed in a number of circumstances. Once Lisa reported:

> When she [the teacher] was at the blackboard, I'd swear I was wrong, and I thought, "Why should I listen...I know I'm wrong and why pay attention." I said, "Carol, can I use your comb?" and here I was combing it and pretending I was listening. I didn't feel like listening because it was getting boring. (Lesson R)

On another occasion Lisa asked the teacher for help. Lisa perceived from the teacher's voice that she had become annoyed with her because she said, "You've done that before!" Lisa's comment in reaction to this was: "That's why I hate asking her and why I ask other kids." While these examples reflect a student's distortion of what really happened, it nonetheless illustrates elements of a student's view of the learning situation; a student whose approach to learning could be described as learned helplessness.

Task perceptions and behaviors. During the interviews, Lisa often referred to the nature of tasks either in terms of their level of difficulty or how well she understood them. As described in the previous section, she frequently commented that she did not understand the material to be learned or that she needed help with the mathematics. Accompanying these cognitions were expressions of negative emotions ranging from anxiety to boredom. While she tended to attribute these perceptions of failure to internal factors, her consequential behaviors varied from situation to situation.

Lisa quite often pretended to listen when she did not understand the lesson discussion:

> I: Were you thinking about the lesson at this time?
> L: No, not really. I was just doing that [demonstrates nodding of the head] so she didn't think I wasn't paying attention.
> I: But were you listening to what she said?
> L: No.
> I: What were you thinking then at that time?
> L: I don't know. I can't remember. But I remember me shaking my head 'cause I saw her look at me and I went like that [demonstrates] and I thought if she saw me I'd get into trouble. So I wasn't paying attention, I was daydreaming. (Lesson R)

While daydreaming was one distracted behavior, others reported by Lisa in the interviews were thinking about Hallowe'en, the weekend and recess, passing notes to a friend, annoying other students seated near her, and planning a play she was organizing for a coming party.

Lisa's perceptions of the tasks were sometimes positive:

> L: I enjoyed it. I'd had so much fun.
> I: Why did you find it fun and enjoy it?
> L: Because it was interesting. I learn geometry better than math--the other kind of math. (Lesson 5)

On other occasions she reported that the worksheets were easy. With the unit test, her initial feelings of threat became feelings of relief when she first looked at the sheets.

> I was looking at it and I thought the first page was easy, the second page was getting a little hard, the third page was pretty easy. The second page was the hard one. (Lesson 9)

As a consequence, Lisa did not wait to listen to the pre-test instructions and words of advice but rather went on ahead.

A commonly expressed feeling toward tasks was that of boredom. Lisa reported boredom during some lesson situations in which she did not understand the material to be learned. She was also likely to report these feelings when she perceived the material being learned to be review:

> I: Were you thinking about maths?
> L: No.
> I: What had happened to the maths at this point?
> L: Boring.
> I: Why was it boring?
> L: Because I knew it already. It was getting boring so I began to play with my desk. (Lesson 2)

Lisa even became bored when the teacher discussed the test questions following the announcement of the test results. The conclusion is drawn that reporting boredom served as a surface expression for when Lisa "turned off" maths. Once a whole class discussion involving material perceived by Lisa to be easy became prolonged; she became bored. Alternatively, when she perceived the discussion to be beyond her understanding, she became bored. The post-test discussion occurred when Lisa was fraught with intense negative feelings. These feelings also had the effect of her "turning off" mathematics so that she became bored.

Specific performances. Lisa's approach to learning was accentuated when reference was made by her, to specific performances during the learning of mathematics. From an initial cognition of success or failure an emotional consequence tended to be expressed. Some of these expressions of emotion seemed to reflect intense feelings:

> I: Can you remember your thoughts and feelings at that time [a public dyadic interaction]?
> L: Actually the question...answering it, right. And I was right. And I was proud too.
> I: Why were you proud?
> L: Because I got it right and I don't usually get it right.
> I: And the teacher answered you in a special way [referring to praise].
> L: Wow, I was listening for that! (Lesson 5)

On receiving back a worksheet, Lisa reported:

> L: I knew I didn't do too well and I got three wrong...I just felt kind of bad because I thought I might have got it.
> I: Why do you think you got three wrong?
> L: Well, I didn't look hard at the bottom when I started it and I go "I don't know how to do this," and she [the teacher] put, "Then ask!" and I did ask and she didn't help me. So I got mad. (Lesson 5)

While Lisa's feelings during the lessons ranged from jubilation at experiencing a minor success to feelings of annoyance with herself for what she described once as a "measy mistake," through to intense feelings of anxiety for significant failures, the most profound emotions of dejection were reported about the happenings involving the unit test.

> I: How did you get on in the test?
> L: Horrible. I did rotten [she scored 54 percent, the class average was 75 percent]. I don't like it. And I am not taking it home either because I'm going to get a licking if I do.

While these comments alluded to a possible underlying motive for the negative reaction, Lisa did perceive internal causes for the performance.

> Oh, I was mad. I said it was all my fault. I should have done it right. And if I do it again, I'm going to get a hundred...I swear. (Lesson 10)

Earlier Lisa reported that she wasn't surprised at the result for she had expected worse: "I had expected worse. Harvey got the lowest though. I am not trying though. I want to try but I can't...I know I am going to flunk this year" (Lesson 10).

Lisa perceived little or no effort-outcome covariation and consequently she seemed to attribute her performance in the unit test as much to a lack of ability as to lack of effort. On other occasions Lisa attributed her poorer performance solely to lack of effort:

> I had one little messy mistake. I knew the answer. It would not have been so bad if I would have not known the answer. But I knew the answer and I was so careless. I was mad at myself. (Lesson 2)

> I: How did you get on in math yesterday?
> L: Well, I got a little bit right and a little bit wrong.
> I just didn't understand quite a bit of it.
> I: Why do you think you didn't understand quite a bit of it?
> L: I don't know. Maybe I wasn't listening. (Lesson 1)

The general pattern, therefore, seemed to be one of attribution to effort for minor failure, and attribution to mainly ability and some effort for what Lisa would have deemed significant failure. It was her self-performance covert behavior during situations involving perceived significant failure which contained many of the characteristics of a learned helpless approach to learning.

Public participation. Lisa reported frequently comments about seeking or avoiding public participation such as contributing to the class discussion or volunteering to demonstrate an idea to the whole class. On some occasions she tried to avoid being selected. These tended to be times when she did not know or was not sure of the correct answer or idea. Under these circumstances Lisa attempted to avoid conveying an impression to other students or to the teacher that she either did not know or was incorrect.

When Lisa volunteered to demonstrate an idea at the blackboard she was equally as concerned for the same reason even though she felt sure at being correct.

> I: How do you feel when you go up to the board like that?
> L: Nervous?
> I: Why are you nervous?
> L: Because I don't know if it's right or wrong, and if it's wrong I'll get laughed at from the kids.
> I: What about when you get it right?
> L: I feel happy. (Lesson R)

On occasions Lisa volunteered to demonstrate an idea in front of the class when she was in some doubt about the answer:

> L: I was thinking, "Could you or could you not do it," and I debated, "Well, I don't think so, but maybe I could."
> I: So you gave it a try.
> L: Yes. I knew I was wrong.
> I: When the teacher picked you, how were you feeling then?
> L: Proud.
> I: Why were you feeling proud?
> L: Because I finally got up there. It's the second time I got up there in a whole year. (Lesson 2)

However, once Lisa perceived she couldn't demonstrate the idea she felt upset. She did not want the other students to see or know that she had failed, and consequently she wanted to escape the situation by sitting down. This incident raised the question of why Lisa should want to risk public failure and its consequences when she was always uncertain of the accuracy of her contribution.

A chain of comments reported by Lisa provided some insight into why she was likely to risk public failure. After trying repeatedly to contribute correct responses during a class discussion, Lisa achieved her hope at a transition point in the lesson:

L: She asked me...I had put up my hand...she goes, "Yes?"...and I go, "Is a bridge parallel?" because I knew it was. I just wanted her to get my attention. So I said, "Is a bridge parallel?" and she goes, "Yes it is."
I: How did you feel then?
L: I felt good. (Lesson 1)

Reasons for Lisa wanting to get the teacher's attention cannot be identified from this specific transcript item but, as a contributory part of an overall pattern, she was probably engaging in behaviors designed to enhance the teacher's overall impression of her.

When Lisa believed she knew the answer to a teacher question in class discussion but was not picked she became annoyed:

> I felt mad, because I put up my hand for nearly every question and she didn't pick me. (Lesson 1)

I: Now you have got your hand up.
L: I know that...it ain't fair. I felt sad in a way because I had my hand up first. I want to say something to her about that...I was getting mad at her...She picks me about once a year maybe if I'm lucky.
I: Well, once every couple of days anyway. (Lesson 7)

Lisa perceived a number of children were asked frequently, whereas she felt she was often ignored by the teacher. While these views were distortions of what really happened, they nonetheless portray the view held by one student. Interestingly, the students named by Lisa whom she believed were asked to respond to questions frequently were all successful students.

Lisa's thoughts and behavior regarding public participation in the class appeared at first to be confusing. However, a balance of motives between seeking the teacher's attention and avoiding public failure seemed to suggest some kind of dilemma for Lisa. The desire to impress the teacher, whom Lisa perceived to be an influential significant other, had to be "weighed" against the risk of sensitive embarrassment if she failed in front of her peers.

Perceptions of other students' behavior. Lisa viewed the behaviors of other students with mixed feelings. Where she found herself being helped in her work, either directly or indirectly, by the efforts of other students her reactions were generally favorable:

> I: What were you thinking at that time?
> L: Trying to think how to do that question. I didn't know how to do it and then when she [another student up at the blackboard] did it, I remembered. (Lesson R)

Lisa frequently received help from Andrew, a student whom she perceived usually knew the answer. He was seated next to her and readily provided assistance when she required help. She often felt encouraged when she noticed that Andrew was experiencing difficulty or was progressing slowly with the same work that she was doing.

With some students Lisa experienced feelings of a different order. When a successful student whom Lisa perceived to be boastful made an error at the blackboard, she reported feeling good because he had to be helped by the teacher while in front of the class. On another occasion Lisa commented that, when students she perceived to be successful went up to the blackboard and correctly demonstrated an idea which she was unable to answer, "I feel like I'm dumb and you are smart" (Lesson R). Once Lisa reported that she wished she could have been in the position of another student who was successfully capturing the limelight when out in front of the class.

Lisa was very aware of other students' performances in the unit test. The students who scored well had their marks announced publicly. Lisa did not approve of the teacher's procedure of recognizing those students who achieved high marks. As she stated, "I knew I wasn't going to get my name called out" (Lesson 10) and, a little later noted that, "It gets you jealous." However, Lisa appeared to be aware of the students who scored low, noting that three or four other students scored lower than her mark. Because one student, whom she perceived normally achieved lower marks, gained a higher mark, Lisa speculated on whether or not he had cheated. She had noted this student had scored the same mark as a successful student who sat next to him. Lisa's behavior in relation to her perceptions of other students' performances in the test revealed something of the intensity of feeling and the impact on her mind of what she deemed to be a significant failure.

While Lisa once reported that she was unconcerned with how other students were performing during the regular learning sessions, she nevertheless seemed very aware of how well her peers were achieving.

Lisa's Basic Ideas and Beliefs

Perceptions of her own mathematics ability. Lisa generally was concerned with her ability in mathematics. She seemed to believe that her lower performance was attributable to lack of ability, as inferred in a number of her comments.

> I usually don't get it right [referring to her response to a public question]. (Lesson 5)

> Last year I was in the low class [referring to the streaming of students for mathematics in Grade 5]. (Lesson 2)

> I have never got a maths test back that I felt happy with. (Lesson 10)

> I: How do you expect you will get on in the test?
> L: Rotten!
> I: What do you mean by rotten?
> L: Hopeless!
> I: Why do you think you won't do well?
> L: I don't like it, and I'm not trying any more. (Lesson 8)

Lisa often disclosed, either directly or indirectly, that she wanted to try but found little reward for her efforts in the ongoing daily lessons.

Overall she perceived some improvement in her mathematics performance since she first started school: "I got a C last year. That was horrible. On the first year I got a D" (Lesson 5). Consequently, Lisa was hoping for an even better grade this year.

> I hope I get a better mark. If I do, I get a ouji game...I just love it. And my Mom goes, if I get a...some...no less than a "B", I get a ouji game. And they are expensive. They are about $6. (Lesson 4)

However, these comments were expressed prior to the unit test. Because Lisa identified the unit test result with her report card, after the test she concluded:

> I know I'm going to flunk this year. I am going to flunk social too. I know. I'm going to flunk. I told my Mom that too, and she goes, "You'd better not or you'll get a whipping." So I'm hoping. (Lesson 10)

Lisa appeared to be aware of her ability in relation to other students' performances. She often referred to situations where she perceived "everyone else knew the answer and I didn't" (Lesson R).

These perceptions had developed into a mind-set for Lisa. Whenever she thought of an answer which she perceived to be different to "everyone else," Lisa assumed she was wrong.

> I was thinking how to do it because I thought there was only 12 out of the whole thing, and then everybody...that person came up with 14, Clare. And I couldn't think. I said, "Oh, I'm gone completely!" (Lesson R)

Watching successful students' performances in front of the class contributed to Lisa's basis for comparison between herself and other students.

The transcripts contained many instances of Lisa attempting to screen from other students the impression that she was a lower achieving student. She was certain that if other students perceived her to be wrong they would laugh at her. Likewise, when she needed help from the teacher, Lisa reported a preference to go to the teacher rather than have her come to the desk:

> I: How do you feel when the teacher is with you like that [referring to desk supervision]?
> L: Okay. I felt better because I knew I'd get it right... I prefer to go and find her, but she won't let me.
> I: Why do you prefer to get out of your seat?
> L: Because nobody can hear what I say [to the teacher]. (Lesson 2)

Lisa seemed very concerned with concealing her perceived lack of ability in the learning of mathematics.

An aspect of Lisa's ability which appeared to have some significance in her self-performance was illustrated by her comment "I had forgotten already." On several occasions Lisa reported forgetting an idea or forgetting a word.

> L: I didn't know what that one word said, intersect____
> I still can't say it...And as soon as she came and told me I knew what it was.
> I: How did you feel then?
> L: I felt stupid with myself, because I should have known that word. We talked about it so much. (Lesson 1)

She even expressed surprise in lesson 9 when the unit test was being distributed for she claimed to have forgotten that as well. Given that this learning difficulty was recorded in Lisa's cumulative school record, the evidence from this study would confirm the influence upon her learning of the difficulty in immediately processing certain information.

Lisa's perception of her own ability reflected an acceptance of lower self-expectations, yet contained elements of hoping for more success. However, with her perceptions of little effort-outcome covariation, Lisa's hopes appeared to be forlorn and there were indications that this was recognized by Lisa.

Lisa's perceptions of the teacher's performance expectations of herself. Lisa often reported that she was concerned about the teacher's impressions of her. She did worry about what the teacher thought about her and this often resulted in her asking other students for help. Lisa endeavoured to avoid conveying the impression to the teacher that she was not succeeding because she had not listened or because she was "dumb."

> I: Why do you feel bad when you get it wrong? [Lisa had volunteered to respond to a public question.]
> L: I don't like to...It's just that I don't like her getting to know...so that, like, the teacher thinks I'm doing better. (Lesson 5)

Alternatively, Lisa engaged in behaviors calculated to convey a good impression of her performance to the teacher. At times the teacher would have observed Lisa to be attending, when actually she reported that she was only pretending to attend. Lisa also adopted some attention-seeking behaviors and often was willing to risk public failure in an attempt to gain recognition from the teacher. Yet underlying these behaviors was Lisa's belief about how the teacher perceived her performance:

> I: Do you think the teacher knows how well you are doing in maths?
> L: Oh yes.
> I: And what do you think she thinks about you and maths?
> L: I'm horrible.
> I: Why do you think she thinks that about you in mathematics?
> L: 'Cause I know. I just think that. (Lesson 1)

Lisa's comments about her achievement in the unit test further exemplified her perceptions of the performance expectations held by the teacher toward her.

> I: What do you think the teacher thinks of you after that test?
> L: Rotten.
> I: Do you think she's surprised about you and maths?
> L: No.
> I: Do you think the teacher has the same idea about you and math as your ideas about you and math?
> L: I doubt it. I'm going to ask her what she thinks about me after school...I'm scared! (Lesson 10)

Perceptions of the teacher's performance expectations of her were not confined to success and failure behaviors. Lisa perceived the teacher differentiated in the selection of students for responding to public questions. She also reported a belief that she was "picked on" for misbehaviors when other students had often provoked her, but would not tell the teacher she was in error for fear of being accused of answering back. However, Lisa was concerned by these incidents for she felt sure that the teacher remembered even small happenings some months later.

Lisa was sensitive to perceived differential teacher behavior, especially following the unit test: "Hers [Mary's] was the same thing as mine and she got it right and I got mine wrong. I think she favored her. I think she likes Mary" (Lesson 10). These perceptions of teacher bias in favor of other students probably served to accentuate Lisa's belief that the teacher held lower performance expectations for her.

Perceptions of tasks and activities. While Lisa often found she was unable to understand the material to be learned, her reported comments did suggest that she felt more uncomfortable in the listening whole class situations than with the seatwork. This notion was supported by her response to the question, "What was the most important part of the lesson?":

> L: Doing the worksheet.
> I: Why do you find it most important?
> L: Because it's more fun, it's not important, and when she just talks she doesn't really give us a chance. (Lesson 7)

Lisa claimed she preferred hard worksheets to those which were easy or about 50/50 because they made her concentrate more.

These views seem somewhat difficult to understand when examined as specific elements but they reflected Lisa's outlook in relation to self-performance. Perhaps she believed that striving to succeed on difficult tasks would convey an impression to the teacher of high effort input--a quality which she perceived was valued by the teacher. The unrealistic expectation of success also seemed consistent with Lisa's hopes for a higher grade in mathematics. Such views would serve only to compound an already complex set of elements and relationships.

A Characterization of Lisa's Conception of Self-Performance

Lisa became the focus of this study because she was perceived to be a less successful student. The results of the attributional analysis of her behavior, together with some of the relevant findings of the quantitative data, have enabled an interpretation to be made of how Lisa might have perceived herself and her self-performance in the learning of mathematics. The major elements of this characterization of her conception of self-performance were:

1. Lisa's approach to learning can be described as learned helpless. She perceived little effort-outcome covariation, believing that failure tended to be uncontrollable by any action on her part.
2. Lisa perceived effort to be the criterion of success as espoused by the teacher, the home, and peers.
3. Lisa frequently perceived a task to be structured such that success or failure was likely to be controlled by external factors rather than by her own effort and ability.
4. Lisa found success to be satisfying and pleasurable. These feelings were the more intense since success for Lisa tended to be infrequent and minor in nature.
5. Lisa was concerned with most failures. Significant failure and public failure occurred frequently and aroused intense

feelings of anxiety and disappointment. Minor failures were annoying to Lisa and often frustrating if they robbed her of experiencing any kind of reward for success.

6. Lisa attributed significant failure mainly to lack of ability and to some lack of effort. Minor failures were attributed mainly to effort.
7. Lisa was in a dilemma regarding public participation. Her first inclination was to avoid public failure situations, yet she seemed to want to contribute for purposes of impressing the teacher.
8. Lisa often perceived other students' success in front of the class as confirming her belief of lack of ability. She did not approve of the procedures followed by the teacher when giving back test results.
9. Lisa believed the teacher held lower performance expectations for her. While she expended some effort to enhance these expectations, she retained the belief that the teacher perceived her as an unsuccessful student.
10. Lisa hoped for a good mark on her report but perceived the goal to be virtually unobtainable. She seemed very aware of her lack of ability but sought to conceal this from herself, her peers, and the teacher during the daily learning sessions. By employing self-protective tendencies such as misattributing lack of success to lack of effort, mood, and the nature of the tasks rather than to lack of ability, Lisa was able to sustain a partially acceptable level of self-esteem and to retain the

socially-approved expectation of better grades. At the same time she engaged in a series of behaviors designed to enhance the teacher's performance expectations held towards her. The teacher was perceived to be the main element in achieving the better grade which, in turn, would appease the threatened pressure from Lisa's home. The fragile behavior network which Lisa seemed to have established for coping with her failure-prone performance was shattered by the reality of the unit test. Her perception of helplessness, her attribution to lack of ability and her intense negative emotions all resurfaced with the realization of her perceived failure.

Analysis of the Dyadic Interactions Between Lisa and the Teacher

The dyadic interactions between Lisa and the teacher were analyzed according to their overt and covert aspects.

Analysis of the Overt Behavior

The results of the analysis of the interaction sequences between Lisa and the teacher are presented in Table 23 and in Figures 11 and 12. Table 23 indicates that Lisa and the teacher interacted dyadically 54 times during 11 mathematics lessons. Of these interactions, 44 were student-initiated, of which 32 were private in nature and 12 were public. The student-initiated private interactions occupied a duration time of 15 minutes 33 seconds across the 11 lessons. Table 24 shows the frequency distribution of the duration of these private dyadic interactions.

Table 23

Frequency Distribution of Dyadic Interactions Between Lisa and Teacher

Type of Interaction	Lessons											Total
	R	1	2	3	4	5	6	7	8	9	10	
Teacher initiated public interaction	2	1	3	1	-	1	-	1	-	-	-	9
Student initiated public interaction	2	2	-	2	-	1	2	2	-	-	1	12
Teacher initiated private interaction	-	-	-	1	-	-	-	-	-	-	-	1
Student initiated private interaction[a]	3	1	3	3	4	5	5	-	3	2	3	32
Total:	7	4	6	7	4	7	7	3	3	2	4	54

[a] Duration of the student initiated private interactions totalled 15 minutes 33 seconds and ranged from 2 seconds to 2 minutes 20 seconds in length.

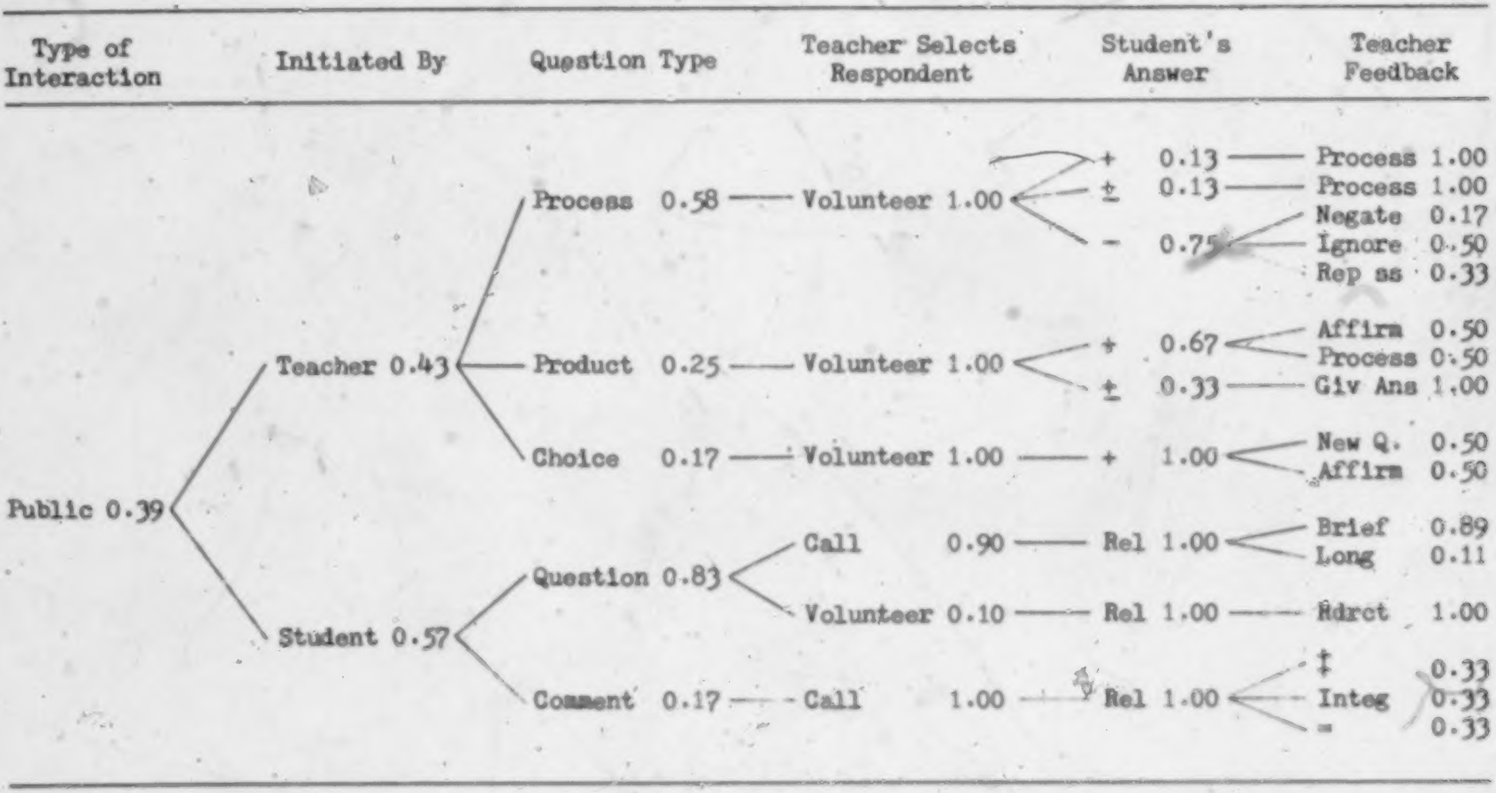

Type of Interaction
Initiated By
Question Type
Teacher Selects Respondent
Student's Answer
Teacher Feedback
Public 0.39
Teacher 0.43
Process 0.58
Volunteer 1.00
+ 0.13
Process 1.00
± 0.13
Process 1.00
- 0.75
Negate 0.17
Ignore 0.50
Rep ss 0.33
Product 0.25
Volunteer 1.00
+ 0.67
Affirm 0.50
Process 0.50
± 0.33
Giv Ans 1.00
Choice 0.17
Volunteer 1.00
+ 1.00
New Q. 0.50
Affirm 0.50
Student 0.57
Question 0.83
Call 0.90
Rel 1.00
Brief 0.89
Long 0.11
Volunteer 0.10
Rel 1.00
Rdrct 1.00
Comment 0.17
Call 1.00
Rel 1.00
‡ 0.33
Integ 0.33
= 0.33

Figure 11. Nature of Public Dyadic Interactions Between Lisa and Teacher and Their Proportions

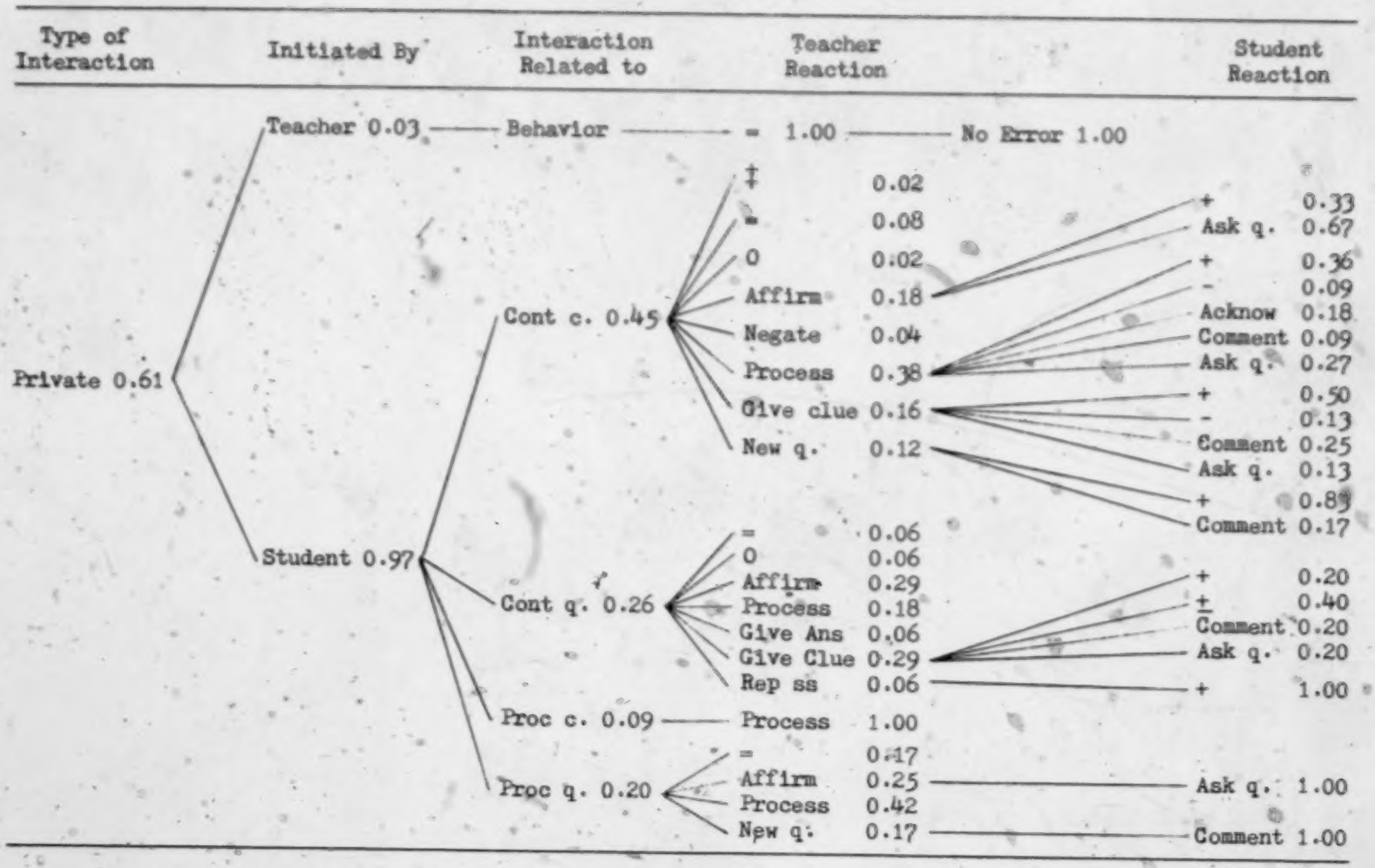

Type of Interaction
Initiated By
Interaction Related to
Teacher Reaction
Student Reaction
Private 0.61
Teacher 0.03
Behavior
= 1.00
No Error 1.00
Student 0.97
Cont c. 0.45
‡ 0.02
= 0.08
0 0.02
Affirm 0.18
Negate 0.04
Process 0.38
Give clue 0.16
New q. 0.12
+ 0.33
Ask q. 0.67
+ 0.36
- 0.09
Acknow 0.18
Comment 0.09
Ask q. 0.27
+ 0.50
- 0.13
Comment 0.25
Ask q. 0.13
+ 0.83
Comment 0.17
Cont q. 0.26
= 0.06
0 0.06
Affirm 0.29
Process 0.18
Give Ans 0.06
Give Clue 0.29
Rep ss 0.06
+ 0.20
± 0.40
Comment 0.20
Ask q. 0.20
+ 1.00
Proc c. 0.09
Process 1.00
Proc q. 0.20
= 0.17
Affirm 0.25
Process 0.42
New q. 0.17
Ask q. 1.00
Comment 1.00

Figure 12. Nature of Private Dyadic Interactions Between Lisa and Teacher and Their Proportions

Table 24

Frequency Distribution of the Duration of Student-Initiated Private Dyadic Interactions Between Lisa and the Teacher

Duration of Interaction in Minutes and Seconds	Frequency
0:01 - 0:10	12
0:11 - 0:20	6
0:21 - 0:30	5
0:31 - 0:40	3
0:41 - 0:50	2
0:51 - 1:00	1
1:01 - 1:10	-
1:11 - 1:20	1
1:21 - 1:30	-
1:31 - 1:40	-
1:41 - 1:50	-
1:51 - 2:00	1
2:01 - 2:10	-
2:11 - 2:20	1

Figure 11 indicates that, of the teacher-initiated public interactions, Lisa volunteered to respond to all question types. Most of the teacher questions were process type questions to which Lisa made incorrect responses. The teacher's reactions to these incorrect responses included negations, ignores, and repeating of student statements. With both product and process type teacher questions to which Lisa volunteered correct or partially correct responses, the teacher provided mainly process type feedback. Student-initiated public interactions were characterized by Lisa calling out relevant questions, to which the teacher provided mainly brief feedback.

The nature of the private dyadic interactions between Lisa and the teacher is presented in Figure 12. Apart from one teacher-initiated contact directed at correcting Lisa's behavior, these interactions were all initiated by Lisa. Most of the dyadic contacts initiated by Lisa concerned the mathematical content of the learning. The teacher reacted with a variety of feedback behaviors, with affirmations, giving of clues, and/or rephrasing the question, and process explanations as the most frequently used. Where teacher feedback involved sustaining behaviors, Lisa's reactions varied with correct statements, asking of additional questions, and the contributing of comments as the most frequently given responses.

Figure 12 also indicates that about 29 percent of the contacts with the teacher which were initiated by Lisa involved procedural matters. The teacher tended to react to these concerns with affirmations or process explanations. A feature of all the private dyadic interactions was the trend for the teacher to use more criticism than praise with Lisa. Across the 11 lessons criticism was coded on eight occasions, whereas praise was coded once.

In summary, where Lisa volunteered incorrect responses in public interactions, the teacher's reactions tended to be brief and neutral both in terms of corrective and evaluative feedback. When Lisa volunteered correct or partially correct responses in public interactions, the teacher tended to affirm or provide process feedback. Private dyadic interactions were characterized by numerous sustained content information exchanges.

The Overall Analysis of the Dyadic Interactions

Some of the dyadic interactions between Lisa and the teacher were analyzed by an overall examination of the observable data, the teacher's covert behavior, and the student's covert behavior. This analysis provided additional descriptive information about the quality of the interactions concerned.

During a whole class discussion, the teacher asked for examples of parallel lines in everyday life. The teacher was confronted with "a sea of hands" and, after hearing examples from some of the students, moved onto the next section of the lesson. Lisa was disappointed that she had not been invited to contribute, so initiated a public interaction at a transition point in the lesson a short time later.

L: Mrs T______.
T: Yes.
L: Is a bridge an example of a parallel line?
T: It probably is. (Lesson 1)

As illustrated in the attributional analysis, Lisa's intention for persisting with the idea was, "I just wanted her to get my attention." The teacher's comments about the incident as reported in the post-lesson interview included:

> I probably should have pursued that with her and asked her to draw a diagram to check out...to see what exactly she was thinking of. That is kind of interesting. I notice with some children you can kind of put them off and they eventually forget about what it is, but not Lisa. She'll...that's typical of her...she'll come back to keep after you till she gets her question answered.

The teacher's report contained little or no awareness of Lisa's need for attention, yet the persistent behavior apparently was not unexpected. However, the report did indicate some puzzlement about Lisa's thought processes. Given the teacher's performance expectations for Lisa, including an awareness of her problem with lack of immediate recall, the teacher's puzzlement could reflect a sensitive reaction to this aspect of Lisa's ability.

On another occasion, Lisa had volunteered to demonstrate an idea. The teacher asked, "Does anyone think they could come out and show how the two triangles [on the overhead projector screen] might be congruent?" Most students dismissed the possibility of the triangles being congruent from visual inspection, but Lisa wanted to attempt a demonstration of the idea. Her report of the interaction episode began with a feeling of delight at having been chosen by the teacher to go up to the front of the class. However, the delight quickly changed.

> I: What were you doing there?
> L: I was showing her on the screen what I meant. If you

> could take that corner to that corner.
> I: I see.
> L: And I didn't want to do it on the overhead so I just wanted to show her that way.
> I: Why did you not want to do it on the overhead?
> L: Because I didn't want anybody to see it because I knew I was wrong as soon as I done it.
> I: Okay, so you had to go on with it. Did you mind that?
> L: Well I was feeling upset because I had finally got up there, then I made a mistake, and it didn't look right and I just...I wanted to get back into my seat...I knew they [the other students] knew I was wrong and I was mad because I was wrong. (Lesson 2)

This traumatic episode for Lisa continued when the teacher used Lisa's error as a discussion teaching point in the lesson. As Lisa recalled, the discussion proved to be as embarrassing to her as when she was trying to demonstrate to the whole class the idea of congruency once she realized that it could not be done.

The teacher's views of the interaction episode were:

> I had the impression at this point that Lisa knew she was wrong. Or that she knew it was not right because she giggled as she came up and she obviously heard the other children say "It can't be done." And yet I almost got the impression that she wanted to be the center of attention or almost playing the dumb role game. I don't know.
>
> I thought it was good though. I thought the class in the end benefited from her mistake.

The teacher seemed to cue accurately to Lisa's desire for being in the limelight, though probably perceived a different reason for Lisa wanting the attention. Whereas Lisa probably was endeavouring to enhance her public academic image, the teacher perceived Lisa to be staging some kind of show. The teacher definitely underestimated Lisa's embarrassment for public failure and her intense feelings of disappointment at herself. This was a reflection of Lisa's ability to conceal her feelings. The teacher instead capitalized on Lisa's error as an opportunity to reinforce teaching points and viewed the episode from this perspective.

The two episodes described in the overall analysis up to this point demonstrate the potency of misperceptions. In the rapid interactions and exchanges of a normal classroom, the teacher seemed only to have time for a single interpretation of Lisa's behavior based on what she saw. This interpretation tended to be based on information the teacher possessed about Lisa and on her interpretations of Lisa's behavior from previous experiences.

The teacher seemed to be alert to Lisa's attempts to get attention. In a later episode involving a student-initiated private interaction, the teacher became annoyed:

> It really did annoy me at the time and I think I spoke at her sharply. I said, "Come on, you have done questions like that before." It was one of the basics. She didn't know how to check for a flip or something or other...I thought, "Are you doing this deliberately to get some attention or...?" I could not believe that she'd forgotten something so basic. (Lesson 6)

Lisa claimed that she had forgotten:

> Like I didn't know how to do it at that time, but I looked back, and then I did, and then I asked her, "I didn't know how to do it," and she goes, "Well, you have done it before."

Nevertheless, the teacher spent 50 seconds working through the exercise with Lisa. While she expressed satisfaction with the help she received, Lisa was sensitive to the criticism, as perceived in the teacher's use of voice, at the beginning of the interaction episode: "That's why I hate asking her. That's why you will see me turning around to Carol." These insights provided some explanations for why Lisa was observed to be interacting frequently during seatwork.

Lisa often initiated dyadic interactions with the teacher because she needed help. The teacher's typical reaction to this need was exemplified by the following verbal report:

> I ended up going through a complete example with her, and watching her step by step and commenting as she went through it...I spend quite a bit of time with her. It seems to follow a pattern almost. I mean, almost every day I seem...she does have problems...I think by doing one with her like that and going over it all again, it just sort of locks it all in. (Lesson 2)

The teacher often alluded to Lisa's learning problem of short memory recall. She also noted that often Lisa's difficulties were problems in reading directions. "I find if I just read the direction for her or go over with her, ask her to read it, that's half the problem" (Lesson 1).

However, after viewing Lisa's behavior on the video recordings of the lessons, the teacher began to speculate on other reasons underlying Lisa's problems with the mathematics.

> I'm thinking now that maybe part of Lisa's problem is that she doesn't exactly pay attention so closely in class. She's busy combing her hair. (Lesson R)

For this episode Lisa commented that when she did not understand she became bored. "I know I'm wrong so why pay attention?" and consequently combed her hair. Later, while viewing another lesson, the teacher commented:

> I notice Lisa wandering around just after I explained it. You would think she would go ahead and work on another example... I'm wondering if part of her short memory recall isn't that she's not paying as close of attention or that her mind wanders while she's trying to learn.

These comments suggested the teacher was considering some possible modification of her thoughts about Lisa. Whereas she had formerly attributed Lisa's problem to a learning disability, the teacher now considered perceiving some of Lisa's problem to be a lack of effort.

The evidence presented indicated that the teacher held lower performance expectations for Lisa and that Lisa was aware of these expectations. The numerous public interactions between Lisa and the teacher reflected Lisa's desire to gain the teacher's attention, probably for the purpose of attempting to convey a favorable impression to her. By being seen to participate and willing to try, Lisa seemed to be responding to the socially approved effort ethic at the same time as maintaining a degree of self-esteem. However, the reality of public failure was nearly always present, hence a deep conflict existed for Lisa personally.

Private dyadic interactions between Lisa and the teacher also involved more than a content information exchange. The teacher provided a generous amount of assistance to Lisa which satisfied her greatly for she usually understood the task as a result of the help. While the help was a form of instructional compensation by the teacher, given the teacher's knowledge of Lisa's specific problem with learning, Lisa was nevertheless concerned about the image she was presenting to the teacher. As a consequence, she engaged in behaviors which were attempts to minimize the teacher's impression that she was not succeeding because of lack of ability or lack of effort.

Summary Analysis

The results of describing Lisa's behavior during the learning of mathematics have established some tentative relationships among and between Lisa's conception of self-performance, Lisa's causal perceptions of success and failure, Lisa's achievement-related behavior, the teacher's behavior towards Lisa, and the teacher's causal perception of Lisa's performance.

1. Lisa wanted a good mark on the report form, preferably one which was better than that gained previously. There were indications of pressure from the home.
2. Lisa perceived that the espoused criterion for success was effort.
3. Despite expenditure of effort, Lisa perceived little or no effort-outcome covariation.
4. A deeper belief held by Lisa was that the cause of failure was perceived to be lack of ability.
5. Lisa perceived that she experienced failures of many forms. They occurred frequently and some were deemed significant because of their assumed importance for her learning progress and because of their perceived influence on peers.
6. Lisa often expressed negative emotions, some of which included intense feelings of anxiety and disappointment.
7. Lisa was observed as a student who was mainly on-task. During seatwork, she was often observed interacting with other students.
8. Lisa often found she could not understand much of the material to be learned.
9. Whenever whole class discussion sessions were prolonged, Lisa tended to engage in discreet distracted behaviors.
10. Lisa endeavoured to enhance her public academic image especially for the benefit of the teacher. However, she had

to balance this desire against the risk of embarrassment of public failure.

11. Lisa was able to maintain some degree of self-esteem for the benefit of herself, her teacher, her mother, and her peers, by engaging in self-protective behaviors which included misattributing her performance to lack of effort, mood, and/or external factors rather than to lack of ability.
12. Lisa perceived the teacher held lower performance expectations for her and this would be realized in a lower mark on her report card.
13. Lisa was very concerned about what the teacher thought of her. She engaged in various behaviors in an attempt to enhance the teacher's impressions of her.
14. Lisa engaged in various attention-seeking behaviors, the intentions of which were sometimes misperceived by the teacher.
15. The teacher held lower performance expectations for Lisa. Incorporated within these expectations was an awareness of Lisa's problem with short memory recall.
16. The teacher engaged in compensatory behaviors with Lisa especially when she needed help with her seatwork.
17. Occasionally, under the stress of normal classroom functioning, Lisa perceived elements of teacher criticism and annoyance toward her which she interpreted negatively. Consequently, Lisa often preferred to seek help from classroom friends, hence the frequent interacting with other students

during seatwork. At times Lisa was the target for corrective behavior during these interactions with other students, which Lisa again interpreted negatively. Lisa's reasons for avoiding asking the teacher for help pertained to the preserving of a more favorable impression.

18. The teacher began to consider modifying her attribution of Lisa's problem to lack of effort as much as to lack of ability, based on presumed lack of attention behaviors by Lisa.
19. Lisa was an unsuccessful student because her approach to learning tended to be characterized by learned helplessness.

GREG

Biographical Information

Greg was the second of two boys in his family which lived in their home in the neighbourhood of the school. He had always lived in Edmonton, mainly on the south side of the city.

Greg was aged 11 years and stated that his main interest was the family dog, an 11 month old German Shepherd. He had begun a rock collecting hobby following a recent visit to the site of petrified wood and bone fossils. Greg reported watching a considerable amount of television, with "Happy Days" and "Charlie's Angels" among his favorite programs. The family had travelled to San Francisco and to the British Columbia coast, as well as throughout Alberta.

While he commented that he fulfilled no duties around the school, Greg nevertheless joined in school-organized extra-curricular activities. He felt the Grade 5 year had been a particularly good one for him as he believed he had learnt well, mainly through the help of a good teacher. His best subjects were mathematics, physical education, art, and language arts. He especially liked to write stories. Greg had two close friends in the class. He enjoyed their friendship because they treated him well in last year's class. Greg's response to the question, "Why do you come to school?" was, "To learn because parents don't know it all."

The teacher viewed Greg as a student with a few problems largely because his ability was not as great as the other students. She believed he knew he was not as bright as the others and perceived that Greg played on this somewhat:

> He almost seems to play that role. I think he finds comfort in it, in a way. Probably in other years he's gotten away with not doing as much work or working as hard because of this. I almost get the feeling he's using it, and I don't know exactly where to draw the line.

Some conflicting information was found in the formal descriptive data. In support of the teacher's comments, Greg achieved in mathematics a percentile score of 9 on a school district wide assessment. This indicated that Greg was a lower achieving student in mathematics. Meanwhile, Greg's total expectation score of 147 on the forced choice, self-rating PAPS placed Greg among the students in his class who had the highest academic self-expectations. His expectations in mathematics sub-score of 24 out of a possible 28 was close to the class mean. Examination of his responses indicated that Greg expected to learn everything that would be taught, that he expected to be better than most kids and that he expected to enjoy math a great deal in the coming year. His self-rating of expectations for mathematics in the long term was consistent with these results. Greg's results on the PAPS were treated with caution given the reality of the other information, yet they raised immediately interesting questions as to why he should rate himself in this manner.

Greg's self-reporting of internal responsibility for success or failure on the IAR revealed that out of 34 situations he attributed 26 to internal causes and 8 to external causes. Because his internal responsibility for success score of 16 was higher than his internal responsibility for failure score of 10, it can be concluded that Greg tended to assume credit for causing good things to happen but was disinclined to accept the blame for unpleasant consequences or circumstances. Examination of his responses suggested that differential causal behavior toward success and failure largely occurred in situations comparing his input of effort with the teacher's explanations, the giving of help, and the teacher's level of concern. In success situations, Greg claimed internal responsibility but with failure situations he attributed blame to the external causes, namely, the teacher and those responsible for his learning development. In situations comparing his effort or ability with perceptions of tasks, other people's moods and views, and others' abilities, Greg claimed internal responsibility for both success and failure.

Quantitative Analysis of Behavior

Greg's behavior during the 10 lessons on mathematics was analyzed quantitatively according to both overt and covert aspects.

Overt Behavior

The results of the analysis of Greg's overt behavior are presented in Tables 25, 26, and 27. Table 25 shows that the majority of Greg's overt behavior was coded as occurring during the lesson situations of teacher-led whole class instruction and in seatwork, these situations accounting for approximately 47 percent and 45 percent, respectively, of the learning time. A high percentage of Greg's behavior in each lesson situation was observed to be attending-listening. As Table 26 indicates, attending-listening behaviors accounted for about 92 percent of Greg's time during teacher-led whole class instruction, about 95 percent of student demonstration whole class instruction, and about 76 percent of seatwork. As a percentage mean of learning time across all learning situations, Table 27 shows that attending-listening behaviors were observed 85 percent of all behaviors during the 10 mathematics lessons.

Most of the remaining time Greg was coded as not attending-listening. Table 27 indicates that across all lesson situations for all lessons the percentage mean for Greg's not attending-listening behaviors was about 11 percent. Tables 25 and 26 show that not attending-listening behaviors were more likely to occur during seatwork where Greg was coded to be not attending-listening on the average of about 15 percent of the time. Not attending-listening

Table 25

Percentage Distributions of Student Overt Behaviors in Each Lesson Situation Category for Each Lesson : Greg

Categories of Student Overt Behaviors Within Lesson Situations	Lessons										Percentage Mean	Within-Category Sum of Percentage Means
	1	2	3	4	5	6	7	8	9	10		
Teacher-Led Whole Class Instruction												47.3
Attending-listening	37.5	59.0	31.5	46.4	30.8	24.5	46.0	51.2	10.4	100	43.7	
Not attending-listening	--	3.3	1.9	--	1.9	3.8	6.0	17.1	--	--	3.4	
Interacting with other students	--	1.6	--	--	--	--	--	--	--	--	0.2	
Out of desk	--	--	--	--	--	--	--	--	--	--	--	
Student Demonstration Whole Class Instruction												7.8
Attending-listening	45.8	1.6	1.9	--	5.8	--	16.0	2.4	--	--	7.4	
Not attending-listening	--	--	1.9	--	--	--	--	2.4	--	--	0.4	
Interacting with other students	--	--	--	--	--	--	--	--	--	--	--	
Out of desk	--	--	--	--	--	--	--	--	--	--	--	
Seatwork												44.9
Attending-listening	8.3	26.2	48.2	39.3	48.1	50.9	26.0	22.0	70.8	--	34.0	
Not attending-listening	4.2	3.3	5.6	7.1	7.7	17.0	2.0	4.9	14.6	--	6.6	
Interacting with other students	4.2	4.9	--	--	1.9	--	--	--	--	--	1.1	
Out of desk	--	--	9.3	7.1	3.9	1.9	4.0	--	2.1	--	2.8	
Supervised by teacher	--	--	--	--	--	1.9	--	--	2.1	--	0.4	

Table 26

Percentage Distributions of Means for Student Overt Behaviors Within Each Category of Lesson Situations : Greg

Categories of Lesson Situation	Categories of Overt Behavior	Within-Category Percentage Distributions of Means[a]
Teacher-led whole class instruction	Attending-listening	92.4
	Not attending-listening	7.2
	Interacting with other students	0.4
	Out of desk	--
Student demonstration whole class instruction	Attending-listening	94.9
	Not attending-listening	5.1
	Interacting with other students	--
	Out of desk	--
Seatwork	Attending-listening	75.7
	Not attending-listening	14.7
	Interacting with other students	2.4
	Out of desk	6.2
	Supervised by teacher	0.9

[a] Means for student overt behaviors derived from Table 25.

Table 27

Percentage Distributions of Student Overt Behaviors
for Total Lesson Time : Greg

Categories of Student Overt Behaviors	Lessons										Percentage Mean
	1	2	3	4	5	6	7	8	9	10	
Attending-listening	91.7	86.9	81.5	85.7	84.6	75.5	88.0	75.6	81.3	100	85.1
Not attending-listening	4.2	6.6	9.3	7.1	9.6	20.8	8.0	24.4	14.6	--	10.5
Interacting with other students	4.2	6.6	--	--	1.9	--	--	--	--	--	1.3
Out of desk	--	--	9.3	7.1	3.9	1.9	4.0	--	2.1	--	2.8
Supervised by teacher	--	--	--	--	--	1.9	--	--	2.1	--	0.4

behaviors during teacher-led whole class instruction and student demonstration whole class instruction lesson situations were coded about 7 percent and 5 percent, respectively, of the time. The student overt behavior categories of interacting with other students, being out of desk, or being supervized by the teacher, were coded as occurring infrequently across all lesson situations.

In quantitative terms, Greg was observed to be on-task much of the time during most lessons, especially in the teacher-led and student demonstration whole class situations. He was most likely to be not attending-listening during seatwork. Tables 25 and 27 show that lessons 6 and 9 were days when Greg was not attending or listening about 15 percent of the time or more. Lesson 8 was a day when he was coded as not attending-listening during teacher-led whole class instruction for 17 percent of the time. The daily variations in his overt behavior can only be explained from an analysis of Greg's covert behavior.

Covert Behavior

Table 28 presents the results of the analysis of Greg's interactive thoughts across the 10 mathematics lessons as determined by the use of CASSIT. Most of the interactive thoughts reported by Greg were self-performance thoughts and behavioral moves--self, which accounted for about 25 percent and 22 percent, respectively, of all thoughts. Approximately another 14 percent of Greg's thoughts were categorized as thinking processes for learning mathematics. Behavioral moves--student, self-performance--feelings, feelings, and non-task-related were categories of thoughts reported on an average

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Table 28

Percentage Distributions of Student Thoughts Over CASSIT Categories
for Each Lesson : Greg

Categories of Student Covert Behavior	Lessons										Percentage Mean
	1	2	3	4	5	6	7	8	9	10	
Subject Matter	7.4	3.4	8.3	2.2	7.0	2.7	--	3.5	--	--	3.5
Cognitive Processes	7.4	24.1	22.2	15.2	14.0	16.2	9.1	13.8	9.5	7.7	13.9
Behavioral Moves--Self	14.8	24.1	33.3	19.6	21.1	13.5	22.7	10.3	28.6	30.8	21.9
Behavioral Moves--Student	7.4	6.9	11.1	4.3	10.5	10.8	15.9	--	14.3	19.2	10.0
Behavioral Moves--Teacher	7.4	--	2.8	4.3	5.3	8.1	6.8	3.5	--	--	3.8
Self-Performance--Thoughts	18.5	27.6	11.1	37.0	28.1	32.4	25.0	27.6	19.0	23.1	24.9
Self-Performance--Feelings	--	10.4	--	13.0	7.0	13.5	6.8	10.3	4.8	19.2	8.5
Feelings	18.5	3.4	2.8	4.3	1.8	2.7	4.5	17.2	19.0	--	7.4
Non-Task-Related	18.5	--	8.3	--	5.3	--	9.1	13.8	4.8	--	6.0

of 5 to 10 percent of all thoughts. Relatively few thoughts in the categories of subject matter and behavioral moves--teacher were reported.

The interactive thoughts in six categories were further analyzed according to sub-categories of what the thoughts were about. They were behavioral moves--self, behavioral moves--student, behavioral moves--teacher, self-performance--thoughts, self-performance--feelings, and feelings. Table 29 presents the results of this more intensive analysis.

Behavioral moves--self. As Table 29 shows, about 67 percent of Greg's behavioral moves--self thoughts pertained to attending-listening. This result would appear to support the findings in the overt analysis, especially as another 18 percent of the thoughts in this category referred to motives for attending. Only a small percentage of thoughts concerned the sub-categories of motives to avoid attending and avoiding or seeking to participate publicly.

Behavioral moves--student. Greg seemed to be aware of what other students were doing and how well they were performing during the learning of mathematics. Table 29 shows that about 46 percent of Greg's behavioral moves--student thoughts were focused upon other students' successes and failures, while another 40 percent monitored aspects of their behavior. Relatively few thoughts were reported which were concerned with what other students were thinking. Thoughts expressed about interacting with other students accounted for only 9 percent of all thoughts in this category.

Table 29

Within-Category Percentage Distributions of
Sub-categories of Selected Student
Thought Categories of CASSIT : Greg

Sub-categories of Selected CASSIT Categories of Student Thoughts	Within-Category Percentage Distributions
Behavioral Moves--Self	
Seek public participation	2.63
Avoid public participation	5.26
Attending-listening	67.11
Motive to attend	18.42
Motive to avoid attending	6.58
Behavioral Moves--Student	
Perceptions of other students' performances	45.71
Inferences of other students' thoughts	5.71
Interactions	8.57
Perceptions of other students' behavior	40.00
Behavioral Moves--Teacher	
Perceptions of teacher's instructional moves	13.33
Perceptions of teacher's reactions	13.33
Interactions	13.33
Perceptions of teacher's behavior	60.00
Self-Performance--Thoughts	
Self-assessment--success	15.22
Self-assessment--failure	21.74
Perceptions of task difficulty	19.57
Perceptions of task structure	20.65
Self-attributions	5.43
Self-expectations	7.61
Significant other	9.78
Self-Performance--Feelings	
Anxiety	53.33
Morally neutral--positive	30.00
Morally neutral--negative	16.67
Feelings	
Positive	45.45
Negative	54.55

Behavioral moves--teacher. Of the few behavioral moves--teacher thoughts reported by Greg, Table 29 reveals that most referred to his awareness of what the teacher was doing, these accounting for 60 percent of the thoughts in the category. Greg reported only a small number of thoughts about the teacher's instructional moves, her reactions to happenings in the class, and about his interactions with the teacher.

Self-performance--thoughts. Greg's reported thoughts pertaining to his successes and failures accounted for about 37 percent of all his self-performance thoughts, with the failures being considered more frequently than the successes. Table 29 also indicates that another 40 percent of self-performance thoughts related to perceptions of the tasks in terms of their difficulty and their structure. Thoughts involving significant others accounted for a further 10 percent of the thoughts in this category, while self-expectations and self-attributions were infrequently reported.

Self-performance--feelings. Thought units coded in this category accounted for 8.5 percent of all Greg's interactive thoughts. As Table 29 reveals, 53 percent of the emotions expressed involved anxiety, ranging from feeling scared to worry. Another 30 percent of Greg's self-performance feelings were morally neutral and positive in nature, while the balance of 17 percent were morally neutral and negative. No morally unneutral emotions were reported by Greg.

Feelings. Of the feelings which Greg expressed about classroom matters and happenings in general, more were negative in nature than positive. Table 29 indicates that feelings such as anger, embarrassment, boredom, anxiety, and dislike were expressed 55 percent of all feelings, while pleasure and amusement accounted for the balance of 45 percent.

Summary of Quantitative Analysis of Behavior

Greg was observed to be on-task for most of the time, especially during whole class discussion lesson situations. Some not attending-listening behaviors were recorded during seatwork. The majority of Greg's reported interactive thoughts focused upon the self, namely, his own performance, his behavior, and his feelings about his performance. While his behavior thoughts reflected a trend for attending-listening, Greg's self-performance thoughts and feelings consisted of failure and negative tendencies, respectively. The attending-listening characteristic of Greg's thoughts were supported by the approximately 14 percent of all thoughts which were categorized as cognitive processes. The nature of the relationship between higher effort input on the one hand and lower outcome on the other may well be discerned from an attributional analysis of Greg's covert behavior.

Attributional Analysis of Self-Performance Covert Behavior

A significant proportion of Greg's mental activity during the learning of mathematics pertained to components of self-performance thoughts and feelings. These aspects of covert behavior contained sets of causal relationships and a base of underlying ideas, views, beliefs, emotions, and lines of reasoning.

Causal Explanations of Greg's Behavior

The transcripts of the interviews with Greg contained several chains of comments. These were collated into five clusters: approach to learning, perceptions of task, specific performance, public participation, and perceptions of other students' performances. Each cluster of Greg's chains of comments is described, with examples and anecdotes included.

Approach to learning. When challenged with new or difficult material, Greg's behavior tended to follow a pattern:

I: How did you find this worksheet?
G: Well, it was kind of hard in fact.
I: How were you starting to feel then?
G: Well, I was kind of mad but I kept on trying to make it work.
I: Did you finally get it?
G: Oh no...I gave up finally.
I: Do you usually like to give up when a thing gets tough for you like that?
G: Sometimes I give up and sometimes I don't.
I: Why do you think you choose to give up?
G: Well, when I feel like I can't do it and I try and try over and again, I finally give up because I'm mad at it.
I: Why do you think you can't do that sort of thing?
G: Maybe I don't try hard and I didn't try different things. (Lesson 5)

This example was typical of Greg's reported covert behavior when confronted with tasks which he could not handle. His comments indicated he expended much effort but when beaten he tended to give up, attributing this failure to insufficient effort. However, other situations of a similar nature suggested that a perceived lack of ability was recognized by Greg. On one occasion Greg reported becoming mad with a worksheet and began to worry about his performance. He attributed his failure in this instance to lack of competency.

Only when a classmate went to the teacher for help did Greg choose to do likewise. As a result of her verbal comments to him Greg felt a great deal better.

> I: In what way were you helped?
> G: Well she told me what my problem was.
> I: What was your problem?
> G: Like, my hand was shaky all the time. And the picture would slip sometimes.
> I: Okay, and how did that help you when you got back to your desk?
> G: Well, so that next time I could try to not make my hand shake a little bit. (Lesson 4)

While Greg reported still being mad with the worksheet, he no longer worried about his performance. In other words, the problem of failure remained but the perceived undesirable consequences had dissipated because of some kind of assurance Greg perceived he had received from the teacher. This interaction episode is fully discussed in the overall analysis of dyadic interactions between Greg and the teacher.

The examples described seemed to epitomize Greg's approach to learning. He frequently had to contend with failure situations in which he perceived little or no effort outcome covariation. There were indications that he attributed his failure to lack of ability and lack of effort, and experienced a variety of negative emotions accordingly. Behaviors and performances of these kinds would appear to be symptomatic, at least to a partial degree, of a learned helplessness approach to learning. However, at times, Greg showed signs of motivated concern toward his self-performance.

Following the announcement of his test result, Greg was attending closely to the teacher's comments. While his result was one of the lowest in the class, he nevertheless was positively motivated.

> I: When she first began speaking, what were you thinking?
> G: Well, I was thinking about things I got wrong, and I was looking at them...I wanted to see what I did wrong. (Lesson 10)

Greg reported he followed the teacher closely throughout this extended discussion session.

Overall, while Greg displayed certain signs of learned helplessness, there were other indications which precluded totally categorizing his approach to learning in this way.

Task perceptions. Greg's verbal comments about his learning of mathematics were characterized by numerous references to uncertainty toward understanding the subject matter and to task difficulty. His cognitions were sometimes accompanied by an expression of an emotion and some causal explanation.

> I: What were you thinking?
> G: I was thinking about the answer to her question and I think I said "Yes." Well, I muttered it to myself.
> I: You never put up your hand though.
> G: No.
> I: Why not?
> G: Well, I wasn't quite sure so I was a bit scared.
> I: In what way were you not quite sure?
> G: Well, like this was the first time I had ever worked on this. (Lesson 2)

In this situation, Greg's response to the teacher's question would have been incorrect. Uncertainty about his understanding was accompanied by some anxiety and was attributed to newness of the subject matter. Greg often claimed that he was reluctant to participate publicly in the discussion because "it was my first time doing this stuff" (Lesson 3).

Greg frequently reported instances of not fully attending, especially during the whole class situations. While he sustained attention for periods of time, he often commented that his mind began to wander once the sessions became prolonged. "I was kind of tired and I wasn't too quite sure of the answer. . . . I was kind of playing with my ruler" (Lesson 5). On different occasions Greg reported being distracted by what other students were doing, by daydreaming, and by concerns beyond the classroom. Even during the test he found himself distracted by what others were doing. The evidence suggests that Greg tended to be distracted when he did not have a clear perception of the task.

At times Greg perceived initially that a task was easy but found it harder than he had anticipated:

> G: Well, like, the first question I did. I had to do it over again, 'cause I didn't get it exactly right.
> I: Who decided for you to do it over again?
> G: I did. I was thinking I should erase it and do it over again.
> I: Why did you want to erase it and do it over again?
> G: Well, so I could get it right. (Lesson 2)

In addition, Greg pointed out that he wanted the teacher to see that his work was right when he handed it in for marking.

On a few occasions, Greg's initial perception of an easy task proved to be well founded:

> G: Well it [the worksheet] looked kind of easy.
> I: How did you find it?
> G: Well, it was okay.
> I: How do you feel you have got on with the worksheet?
> G: Pretty good.
> I: Why do you think you have done pretty good?
> G: Well I was going kind of pretty fast. Like, I followed her...I knew what to do because I was listening. (Lesson 3)

Greg attributed his clear perception of task to effort during the whole class instruction lesson situation.

His initial perception of the unit test relieved him of some deep anxieties. Prior to the distribution of the test materials, Greg reported: "I was scared and I was hoping she would have forgotton about the test...I don't like tests all that much because I'm scared that they will be hard" (Lesson 9). Greg associated hard questions with a poor performance. However, when he first looked over the test, Greg realized that it was as easy as he had hoped and expected little or no trouble. At the end of the test Greg felt "pretty good" because he believed he had nearly all of it correct. "I will tell her [my Mom] that I had my maths test today and that it wasn't too hard" (Lesson 9). These perceptions of the unit test by Greg are interesting, given that he scored 43 percent--the second lowest mark of all the students in the class.

Specific performances. Greg often made reference to specific successes and failures which tended to be accompanied by the expression of an emotion. While working on a worksheet the teacher had publicly asked him a question.

> I: What were your thoughts when you heard your name called?
> G: I was kind of scared because I didn't know what she wanted me for because I didn't think it was about the maths sheet.
> I: What went through your mind at that time?
> G: Well, I was thinking about the answer I drew. Like the cross...I felt good because she accepted my answer...I was right and she agreed.
> I: Now just after she had finished talking with you, can you remember what you were thinking and feeling at that time?
> G: I was feeling good because it had made me feel better. And I was right. (Lesson 7)

On another occasion, when the teacher was returning worksheets, Greg felt anxious while waiting for his paper.

G: I was kind of shaky. Like, if I did good or bad.
I: What went through your mind when you actually had the paper in your hand?
G: I was kind of happy with the work I did; and some things.
I: Why was that?
G: Well I did kind of good in math...on the sheet.
I: How well did you do?
G: Well, on the first question I didn't do very good, and the last one. The rest I did pretty good.
I: Did you think that was about as good as you could do at this time?
G: Well, no! I thought I could do better.
I: Why do you think you didn't do as well as you could have done?
G: Maybe I didn't try too hard or I wasn't paying attention maybe. (Lesson 5)

This example typified a number of chains of comments, particularly in terms of the doubtful attribution of failure to effort. As the transcript sample also indicates, Greg perceived success when he judged he had obtained as many correct responses as needed to allay the fear of failure. His early concern before receiving back the worksheet suggested that the possibility of failure definitely existed in his mind. Therefore, Greg's threshold for success or failure seemed closely linked to his feelings toward self-performance.

These notions were brought sharply to focus with the results of the unit test. Prior to the announcement of the test results, Greg reported:

G: I wasn't feeling too good.
I: Why not?
G: Well, I was kind of scared I might get the lowest mark maybe. (Lesson 10)

Again Greg considered the possibility of perceived failure. He was very concerned about the teacher's reactions and his Mom's reactions if he gained the lowest mark or a bad mark.

> I: Greg, how did you get on in the test?
> G: I had 43 percent.
> I: And were you surprised at the result?
> G: Yes a bit.
> I: Why were you surprised?
> G: Well I did good sort of. Like I didn't get all...why, I got some right but sometimes I got half of them wrong, right.
> I: Why do you think you got about half and half?
> G: Well like, maybe I was paying attention a bit on math and thinking of different things like the diorama...I also didn't study for it.
> I: How do you feel about the result generally?
> G: Not too bad. (Lesson 10)

Greg's attribution of his performance to effort or lack of effort again seemed doubtful. Also, he reported that he viewed his test result as a partial success.

> I: What were you thinking when you first looked at your score?
> G: Well, I looked at the 43 percent and then I looked at the blackboard to see how high it was from the top. I didn't feel too bad. (Lesson 10)

While Greg's remarks probably reflect a hidden concern about his performance, he seemed relieved that he had not gained the lowest mark in the class. This may well have proved to be the basis of his partial success.

Overall, Greg experienced few real successes but frequently faced the prospect of perceived failure. However, by accepting a lower threshold level for differentiating between success and failure, which seemed closely linked to feeling good or feeling bad, he seemed able to cope with his all-round lower level of achievement. Greg reported attributing his lower performance level to lack of effort, but these causal explanations, by the manner in which they were expressed, tended to be unconvincing, suggesting that Greg might have perceived other factors to be responsible.

Public participation. Greg preferred not to participate publicly. On several occasions he reported he was unwilling to demonstrate an idea in front of the class:

> G: I kind of get shy when I'm up there in front of the classroom.
> I: Why do you become shy?
> G: Well, like, everyone's looking...watching you. That makes me kind of feel funny. (Lesson 5)

Greg indicated in an earlier lesson that he preferred not to be the first one up at the front of the class to demonstrate an idea but, if the teacher had called on him, he would have gone through with the demonstration. In some instances his main reluctance to participate seemed to focus on his feeling of perceived uncertainty toward the subject matter because this was his first exposure to motion geometry. More likely, however, Greg preferred not to volunteer to participate in order not to place himself in a situation of potential public failure. When commenting about a practical joke that was played on a boy who was demonstrating an idea in front of the class, Greg stated: "I wouldn't feel all that good if I was him, because I might think that they were laughing at my answer...that I was getting it wrong" (Lesson 1). Greg noted that he would prefer the other students to laugh at something he was wearing than laugh at the quality of the ideas he was demonstrating.

Greg tended to volunteer to contribute an idea during whole class discussion only when he was absolutely certain of the answer. However, Greg's hand raising was characterized either by putting his hand half up or by putting his hand up a little later than others, usually when he observed the teacher was on the point of selecting from other volunteers.

I: You put your hand up there. You put it up a little later than others. Why was that?
G: Well, maybe 'cause they thought of the answer before I did. (Lesson 7)

Greg reported not being disappointed when another student was chosen and felt that his slowness at putting up his hand and his desk placement near the back of the room contributed to this non-selection by the teacher. He believed the teacher selected students to respond on the basis of first hands up and sometimes because she noted that a student had not answered for some time. Greg commented that the teacher did not seem to pick on some students more than others.

Overall, Greg appeared reluctant to volunteer to demonstrate ideas in front of the class or contribute ideas toward the class discussions. While he frequently claimed he was unsure of whether he would be correct or not, largely because of unfamiliarity with the subject matter, he also seemed to engage in behaviors designed to avoid participation. His expected feelings of nervousness and shyness when in front of the class were emotions which he perceived might contribute negatively to his public image.

Perceptions of other students' behavior. Whenever other students were demonstrating ideas in front of the class Greg tended to have little or no desire to take their place, but he did use their ideas and answers as a basis for comparison with his own.

I: Now, Lisa goes up and works on this. What were you thinking and feeling then?
G: That's when she put the mark with those squares and then

> she did it from the bottom to the top of the other one. And that's when I was sure it was wrong. You couldn't do it. Then I was quite sure I was right. (Lesson 2)

Where Greg perceived success when another student was unsuccessful he tended to have good feelings. However, he felt differently when a student whom Greg perceived to be less successful at maths succeeded where he failed.

> G: Well, I was...like he had his all right...like all of them and I didn't have all of them right. So it didn't make me feel too good.
> I: Would you like to explain this feeling that you didn't feel too good?
> G: Well, I felt kind of...well I didn't feel good because like he got his right and maybe I didn't trace mine that good. Maybe I was going too quickly in tracing. (Lesson 6)

In the pre-test interview Greg did report that he was concerned about how other students would perform in the test. "Well, I mostly think how good they are" (Lesson 8). During the test Greg became aware of other students finishing early.

> I: What thoughts did you have at that time?
> G: Well, I was wondering if they went fast or if they...if I went slow. (Lesson 9)

Greg had expected some of those who finished to be the first through the test, but some who finished early did surprise him. He was able to learn from the manner in which the teacher announced the results how others performed on the test.

Greg's Basic Ideas and Beliefs

Self-expectations. Greg seemed to hold generally lower self-expectations for his performances. At times these self-expectations seemed to be a function of his perceptions of the tasks such as exemplified in a pre-lesson interview.

I: How do you think you will get on in maths today?
G: Fairly good. It's not too hard.
I: Why do you think you'll get on pretty good?
G: Well, because I'm here [had been absent earlier in the week] and she explains it well.
I: What is there about today's maths that makes you think you will do fairly well?
G: Well, from the other work, it is kind of easy. (Lesson 1)

As the pre-test interview showed, terms used by Greg such as "fairly good" or "pretty good" referred to about a 50 percent pass rate.

I: How do you expect to get on in the test?
G: Maybe good.
I: What do you mean by maybe good?
G: I would say maybe about half and half.
I: Why do you think you are going to get about half and half?
G: Well, 'cause there are some hard questions like...
I: How do you know they are hard?
G: Well from the worksheets maybe, because that's where it's all coming from. (Lesson 9)

Greg's disinclination to participate publicly also underlined the expectations he held for himself. He did not want other students to know his level of performance or ability and preferred to use avoidance processes where possible. When Greg needed help from the teacher he reported:

G: I like to wait when there is hardly anyone there, so that I'll feel better.
I: Why does it make you feel better?
G: Well like, kids...they might laugh at the question I have to ask for. (Lesson 1)

Greg's uncertainty about many of his responses to the questions asked of the class by the teacher probably added to his belief of lower expectations.

A clear indication of Greg's self-expectations was revealed in his comments when awaiting the handing back of his unit test results. "I was kind of scared I might get the lowest mark, maybe . . . I wasn't thinking I would get the lowest mark but maybe a little close to it" (Lesson 10). With his test result, Greg commented, "Well, I would say it's about what I usually get."

The direct evidence and interpretations of a variety of his comments tend to support the conclusion that Greg held lower performance expectations for himself in the learning of mathematics. While he tended to report that he attributed his lower performance to lack of effort, the evidence would suggest other causal factors were perceived to be responsible. Greg often commented that he tried very hard but still failed.

Greg's perceptions of the teacher's performance expectations of himself. Greg often expressed concern about what the teacher might be thinking of him. He tended to believe she perceived him to be "in-between bad and good in maths" (Lesson 4) which he considered to be a fair reflection of his performance. When he provided the correct response to a public dyadic interaction between the teacher and himself, Greg felt particularly good because he believed the incident would help her to think he was doing well. "I think it might give me a better mark on my report card" (Lesson 7). This incident typified Greg's desire for the teacher to notice that his work was correct.

His thoughts around the unit test situation provided insights into what he perceived the teacher's impression of him was like.

> I: What sort of thoughts do you think she is going to have about you and motion geometry after tomorrow's test?
> G: Maybe good...She might want me to go more than half and half...maybe all right or a little more than a half. (Lesson 8)

These thoughts reflected the reality of the teacher's expectations matching his own, yet Greg also implied that she would like him to achieve better. On the day of the test Greg felt he had managed to succeed with most of the test; yet, as he handed it in: "Well, I was kind of scared...I was kind of worrying what she would think...me done that fast" (Lesson 9). After the test was marked, Greg reported:

> G: She might think I haven't been trying too hard or something, maybe.
> I: Do you think she would have been surprised about the mark?
> G: No. (Lesson 10)

Greg commented that the teacher's views on his performance in mathematics were about the same as the ideas he held about his performance.

Greg seemed to be of the opinion that the teacher would ascribe her lower performance expectations for him to a lack of effort. Earlier in the lessons Greg had commented that if he had answered incorrectly one of the teacher's questions:

> G: I wouldn't feel too good.
> I: For what reasons?
> G: Well, like, I wouldn't have the answer and she might think I was fooling around, maybe. (Lesson 7)

Overall, Greg perceived the teacher held lower performance expectations for him and that these were possibly based on an attribution of lack of his effort.

Perceptions of other students' performances. Greg seemed to perceive clearly the achievement hierarchy of students in the classroom.

> I: Why do you think they did better?
> G: Well there is lots of smart kids in the classroom.
> I: Do you know who the smart kids are?
> G: Some of them.
> I: How do you know they are smart?
> G: Well, like they are good in other things, like maybe reading, language arts...they answer a lot of questions

and stuff. They get a lot right.
I: Do you know who the not so smart kids are in the room?
G: Yes.
I: Why do you think they are not so smart?
G: Well, maybe they don't get all the questions right or maybe or sometimes they don't pay attention very much...they didn't try too hard. (Lesson 5)

Greg had noticed that the students who were good at mathematics tended to answer more questions and especially the difficult questions. While he did not expect to score the top mark in the test, he did guess successfully the two likely candidates from among the class. Again, Greg perceived that less successful students were those who expended insufficient effort.

Perceptions of tasks and activities. Greg reported activity sessions such as completing worksheets to be the most important part of the lessons in mathematics. As he explained, "When we do our worksheets then I know what is going to be coming up ahead." He preferred worksheets which were somewhere in between hard and easy.

I: Why do you prefer those particular ones?
G: Well, so the easy ones could help you understand it and the harder ones make you think a lot more. (Lesson 8)

His rationale for this view was that it was best if a person did not have to think hard all the time nor have to not think at all throughout the maths lessons.

In terms of the total unit, Greg felt that he would remember the worksheet activities more than anything else that happened during the 10 lessons. But the most important aspect of the whole unit on motion geometry for Greg was the unit test. Marks were given for the tests which he realized counted toward his report card.

On several occasions during the interviews Greg made reference to the report card. When he was worried about his performance on a worksheet he commented:

> G: I was worried, like...I was thinking that I would get lots of them wrong.
> I: Why would that worry you?
> G: Well...like, when the test came, when I do the test, I wouldn't do too good on it.
> I: Why would you not like to do badly on a test?
> G: So I could get a better mark on my report card. (Lesson 4)

Greg reported in the pre-test interview that he did care about how well he did on the test because of what it meant for his report card. He even wished he could get more correct than he expected for this reason. On the day of the test Greg felt he concentrated more than he usually did for a worksheet in order "to get better marks on my report card." The motivating effect of the unit test and its implications for the report card seemed to be prominent throughout the entire mathematics unit.

A Characterization of Greg's Conception of Self-Performance

Greg was selected for study because he was judged to be a less successful student. A characterization of his conception of self-performance was interpreted from the available evidence. The major elements of this characterization were:

1. Greg's approach to learning consisted of several elements of learned helplessness. He perceived little effort-outcome covariation, believing that failure tended to be controlled by external factors. However, on a few occasions, he displayed elements of a positive, functional approach to

learning, but these occasions were usually short-term in duration.

2. Greg's perception of tasks influenced his achievement-related behavior. Where he perceived the task as easy and to be structured as a skill task, Greg attributed his successes and failures to the amount of effort expended. But, when perception of task was not clear, he attributed the frequent failures to a considerable lack of effort. Extreme lack of effort, in Greg's terms, appeared to be synonymous with lack of ability.
3. Greg found success to be satisfying and pleasurable, especially since he experienced it infrequently.
4. Greg experienced intense negative feelings of anxiety and anger with significant failures.
5. Greg's threshold for perceived success and failure seemed to be a function of his feelings about his performance rather than a function of any predetermined level of achievement. If his low achieving performance was perceived by Greg to be better than expected, better than some feared level of achievement, or better than some unwished for class ranking, he felt good and viewed it as a relative or partial success. The converse appeared to apply when a low achieving performance was viewed as a relative or partial failure.
6. Greg sought to avoid participating publicly. He seemed to adopt avoidance processes designed to prevent other students from learning of his level of performance.

7. Greg was aware of other students' performances which he used as a basis for comparing his own performance.
8. Greg held lower performance self-expectations.
9. Greg believed the teacher held lower performance expectations for him. He was concerned about her impressions of him.
10. Greg perceived clearly the classroom achievement hierarchy in relation to himself. This served to reinforce his lower self-expectations.
11. Greg was concerned about his report card. Because he held lower self-expectations and because he perceived the teacher held lower performance expectations of him, Greg was worried as to how he could achieve the good mark on his report. He was afraid that the teacher might perceive him as one who exerted little effort, as revealed by his performances on the worksheets and the unit test. Greg believed that effort expenditure was the causal criterion of success. His anxiety in the learning situation appeared to be centered on this dilemma--he wanted to present a favorable image to the teacher of his work input and yet he could not achieve the results to support the effort exerted. Consequently, Greg sought to conceal his real level of performance from the teacher, from his peers, and even from himself. He preserved a degree of self-esteem by adjusting his threshold of perceived success as well as engaging in avoidance processes with other people in the classroom. These face-saving approaches enabled him to mask his real level of performance and to often view his

results through positive eyes. Wherever possible he sought to avoid diminishing the teacher's impression of him.

Analysis of the Dyadic Interactions Between Greg and the Teacher

The dyadic interactions between Greg and the teacher were analyzed according to their overt and covert aspects.

Analysis of the Overt Behavior

The results of the analysis of the interaction sequences between Greg and the teacher are reported in Table 30 and in Figures 13 and 14. Table 30 shows that Greg and the teacher interacted dyadically 13 times during the 10 mathematics lessons. Only two of these were public in nature, both teacher-initiated. Most of the interactions occurred at the private level, five being teacher-initiated and six being student-initiated. Duration of the private interactions totalled 2 minutes 43 seconds, comprized of 1 minute 5 seconds for teacher-initiated interactions and 1 minute 38 seconds for student-initiated. On three of the days there were no dyadic interactions of any kind between Greg and the teacher.

Figure 13 indicates that with the two public teacher-initiated interactions, Greg was selected as a non-volunteer to respond to one product and one choice question. His answers were correct, to which the teacher provided feedback that was neutral but extended in nature.

The nature of private interactions between Greg and the teacher is presented in Figure 14. Two of the five teacher-initiated interactions were related to behavior and involved issuing of warning

Table 30

Frequency Distribution of Dyadic Interactions Between Greg and Teacher

Type of Interaction	Lessons										Total
	1	2	3	4	5	6	7	8	9	10	
Teacher initiated public interaction	-	-	-	-	1	-	1	-	-	-	2
Student initiated public interaction	-	-	-	-	-	-	-	-	-	-	-
Teacher initiated private interaction[a]	1	1	-	-	2	1	-	-	-	-	5
Student initiated private interaction[b]	1	-	-	1	-	-	2	-	2	-	6
Total:	1	1	-	1	3	1	3	-	2	-	13

[a] Duration of the teacher initiated private interactions was 10, 2, 48, 3, and 2 seconds, respectively.

[b] Duration of the student initiated private interactions was 47, 19, 5, 8, 9, and 10 seconds, respectively. Total duration of private interactions was 2 minutes 43 seconds.

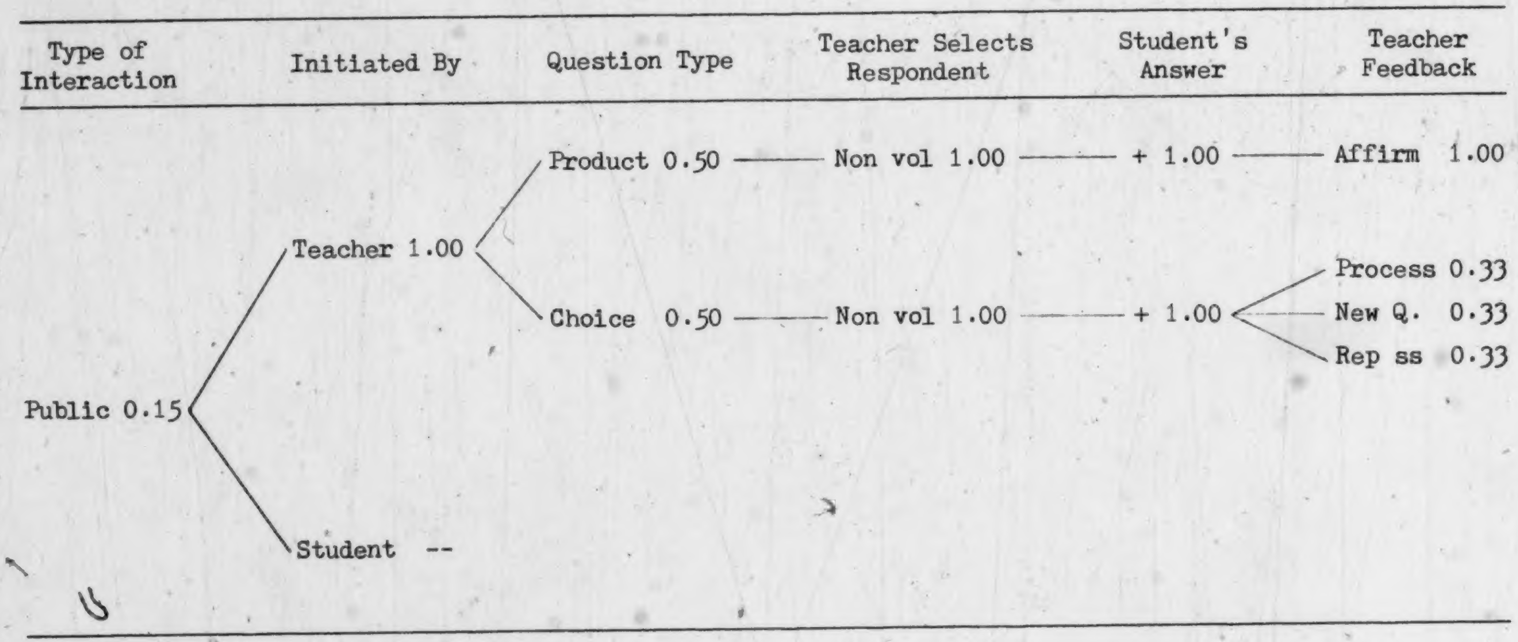
Type of Interaction
Initiated By
Question Type
Teacher Selects Respondent
Student's Answer
Teacher Feedback
Public 0.15
Teacher 1.00
Student --
Product 0.50
Choice 0.50
Non vol 1.00
Non vol 1.00
+ 1.00
+ 1.00
Affirm 1.00
Process 0.33
New Q. 0.33
Rep ss 0.33

Figure 13. Nature of Public Dyadic Interactions Between Greg and Teacher and Their Proportions

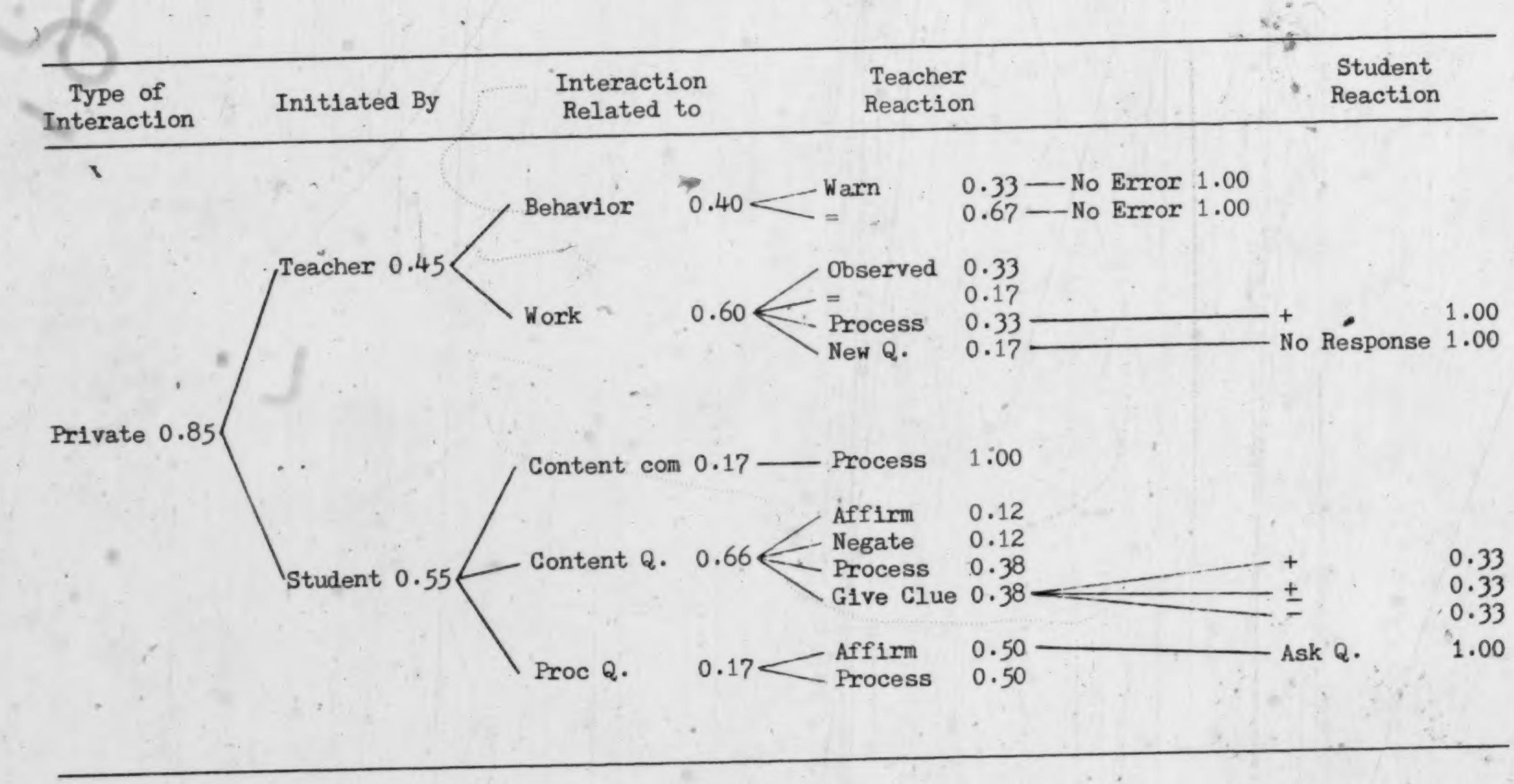
Type of Interaction
Initiated By
Interaction Related to
Teacher Reaction
Student Reaction
Private 0.85
Teacher 0.45
Student 0.55
Behavior 0.40
Work 0.60
Content com 0.17
Content Q. 0.66
Proc Q. 0.17
Warn 0.33
= 0.67
Observed 0.33
= 0.17
Process 0.33
New Q. 0.17
Process 1.00
Affirm 0.12
Negate 0.12
Process 0.38
Give Clue 0.38
Affirm 0.50
Process 0.50
No Error 1.00
No Error 1.00
+ 1.00
No Response 1.00
+ 0.33
± 0.33
− 0.33
Ask Q. 1.00

Figure 14. Nature of Private Dyadic Interactions Between Greg and Teacher and Their Proportions

and criticism by the teacher. The work-related teacher-initiated interactions involved brief periods of observations of Greg's work by the teacher during desk supervision. Two of these interactions were recorded as observations only, while the third interaction involved a verbal exchange of content information. Most of the dyadic contacts initiated by Greg concerned the mathematical content of the learning. These interactions tended to be short term, for which the teacher provided a variety of feedback behaviors such as affirmation, negation, process explanations and giving of clues.

In summary, Greg's interactions with the teacher were largely private in nature and tended to be brief. Aside from three interactions, the dyadic contacts were of 10 seconds duration or less, involving brief exchanges of communication. Apart from the two behavior incidents, the teacher's reactions were neutral. On work-related interactions she tended to affirm, provide process feedback, or give clues.

The Overall Analysis of the Dyadic Interactions

Some of the dyadic interactions were analyzed by an overall examination of the observable data, the teacher's covert behavior and the student covert behavior. With Greg, the very small number of interactions meant that only a sample of behaviors could be described. Nevertheless, the items provide additional relevant data in the relationship between Greg's conception of self-performance and the teacher's thoughts about him.

During lesson 1 Greg initiated an interaction with the teacher explaining that he did not understand the worksheet task. Greg reported that he had not wanted to go to the teacher because of what she might think about him, yet finally he felt compelled to handle the task in this way. He approached her near the blackboard and when the interaction commenced they were alone. Greg felt fine about the teacher's explanation until another student, whom he perceived to be smart at mathematics and confident in manner, approached waiting to talk with the teacher. From that point on Greg wanted to sit down, to escape from conveying an impression to the peer that he needed any kind of help. He was particularly troubled when the teacher, perceiving him to be now confused and interpreting this as still not understanding, began to reteach the ideas on the blackboard. This served to embarrass Greg even further so he withdrew prematurely from the interaction. As Greg confided in the post-lesson interview, he still did not understand the worksheet task.

Meanwhile the teacher had been puzzled by Greg's behavior:

> I did not know if I was not making my questions clear, but it seemed every question I asked him he came up with something totally off course.
>
> I said, "Now what were we talking about today? What has the lesson been on?" and he didn't even...he said "seg...ments." And he was even stumbling on the words, and I thought, "My goodness! What's gone wrong here? He hasn't been paying attention or something." (Lesson 1)

The teacher's first reaction was to check her own explanation, hence she made recourse to the blackboard. When she noted that Greg finally knew what the lesson had been about, she asked:

> "What is your worksheet on?" "Oh yes, rays," and he turned and left and of course we hadn't even talked about the question that was actually bothering him in the first place. (Lesson 1)

The teacher had often noticed this aspect of Greg's behavior, "He thinks he understands things too quickly!" Greg's explanation, involving the desire to withdraw from the presence of the other student, was not perceived by the teacher. Her inclination was to attribute the cause of the behavior to lack of effort during the earlier listening session. Because she had to deal with another student, she soon forgot the incident. Greg, on the other hand, had retreated feeling bad about the situation. He suspected the teacher was more aware of his lower level of performance, he perceived he had failed to save face in front of the peer, and he still had not resolved the original difficulty.

On another occasion, Greg approached the teacher and initiated the interaction with the comment, "Look what I've got--it looks horrible!" (Lesson 4) Despite frequent attempts and much effort he had trouble with using the Plexiglas to good effect. He now sought help. Greg felt satisfied with the teacher's comments about trying not to be so shaky and left the interaction no longer feeling worried. The teacher perceived the cause of Greg's problem to be a lack of good coordination for this was similar to his difficulty with handwriting:

> I didn't want to knock him down really and sort of say, "That's terrible," or something. So I said, "It's a bit shaky," or something like that.
>
> This indicates Greg's attitude though. He believes himself to be dumb. You know, he thinks he is not smart. And he is usually the first one to admit it. And I think he is believing he is not smart and he doesn't even attempt some things. (Lesson 4)

Analysis of this interaction episode raised a number of underlying explanations of behavior. While the teacher was sensitive to Greg's situation and acted accordingly, her general views about Greg's overall performance seemed to conflict with those of Greg. She perceived that Greg believed he was lacking in ability but she tended to infer that greater effort by Greg would overcome the problems he was experiencing. Greg recognized the high value placed on effort by the teacher.

In the interaction episode, Greg felt he had expended considerable effort for no return. He perceived the cause of the problem was either a lack of ability or some external factor such as the nature of the task or teacher explanation. Greg's problem was one of compromising this realization with the expected effort-oriented perspective of the teacher. Yet following the interaction Greg reported feeling better even though he was still mad with the task. Apparently Greg had interpreted the teacher's feedback comment to him as not criticizing him for lack of effort. While Greg might have pondered as to why he could not do the task, he felt the teacher's impression of him had not been diminished by this perceived failure experience. He perceived the teacher's performance expectations for him had been maintained.

A third dyadic interaction between Greg and the teacher further underlined the teacher's views about Greg. Greg was busy working on a worksheet with the class functioning quietly when he inadvertently knocked a ruler to the floor. The teacher immediately asked Greg a question.

> I: You were looking around the room when he dropped something. Was that the trigger for you to ask him that question?
>
> Tr: No, I think it was a combination of two things. I hadn't spoken to him yet at that class and also I felt he was not paying attention. I thought this might jar him back into...But he obviously had been doing something because he had an answer. (Lesson 7)

Greg became a little scared when he heard his name because he was uncertain as to the reason for the interaction. However, this was an interaction episode which proved to be a successful experience for Greg. He felt that the teacher's impression of him would be enhanced and that ultimately, "I think it might give me a better mark on my report card." Greg also believed that if he had failed she would attribute that to lack of effort. Because in this incident the teacher had considered that Greg's input of effort might have been questionable, the participants in the dyadic interaction apparently were thinking along similar channels.

Overall, the evidence suggests that the teacher held lower performance expectations for Greg and that these were based on a perceived lack of effort. Greg seemed aware of these expectations. His problem was to convince the teacher he was trying hard which he perceived to be the basis of her expectations for him. From the few dyadic interactions which were amenable to detailed analysis, Greg seemed very conscious of the kind of impression the teacher might have of him and attempted to present as positive an image as possible.

Summary Analysis

The results of describing Greg's behavior during the learning of mathematics have revealed some possible relationships among and between Greg's conceptions of self-performance, Greg's causal perceptions of success and failure, Greg's achievement-related behavior, the teacher's behavior towards Greg, and the teacher's causal perception of Greg's performance.

1. Greg wanted to gain a good mark on the report card.
2. Greg perceived that success in achieving this goal was dependent on the expenditure of effort.
3. Greg recognized that the teacher valued highly the exertion of effort.
4. Greg exerted considerable effort for little or no outcome return.
5. Greg perceived the teacher held lower performance expectations for him.
6. Greg perceived the teacher based these lower performance expectations on a lack of effort.
7. Greg was viewed as a student who was mainly on-task.
8. The teacher perceived Greg held lower performance self-expectations which he attributed to lack of ability.
9. The teacher held lower performance expectations for Greg based on attribution to lack of effort.
10. The teacher appeared to "communicate" these expectations to Greg through differential behaviors and response opportunities for different levels of students.
11. Greg appeared to engage in behaviors which were designed to convince the teacher he was expending considerable effort and that his lack of success was attributable to other factors.

12. Greg was a less successful student because in many respects he was learned helpless in his approach to learning.

A Summary Comparison of Lisa and Greg

This chapter has described the achievement-related behavior of two "less successful" students, Lisa and Greg. Both students were observed mainly to be on-task most of the time, especially during teacher-led and student demonstration whole class instruction. Behaviors other than attending-listening were more likely to be coded during seatwork. In these situations Lisa was often observed to be interacting with other students, while Greg's behavior was often coded as not attending-listening. In quantitative terms, the interactive covert behavior of the two students was similar in pattern except for one difference. Greg's thoughts seemed to be more task-oriented than Lisa's, whereas Lisa's thoughts were slightly more self-oriented than Greg's.

Lisa and Greg both desired a good grade on their report card. They seemed to believe that the teacher--the person who distributed the report grades--espoused effort as the criterion of success. Consequently, Lisa and Greg exerted much effort yet experienced little effort-outcome covariation. This often resulted in intense negative feelings and causal perceptions of failures to factors other than effort. Both students displayed tendencies of a learned helpless approach to learning. By perceiving tasks to be structured such that success on them would be determined by factors external to their control, Lisa's and Greg's self-conceptions of performance were characterized by failure perspectives and negative consequences.

Overall, Lisa and Greg differed only slightly in how they coped with these undesirable self-conceptions of performance. Both seemed aware that the teacher held lower performance expectations toward them and both believed the teacher based these expectations on lack of effort. As a consequence, Lisa and Greg engaged in behaviors designed to protect their levels of self-esteem, such as presenting favorable work-oriented images to the teacher. In addition, Lisa often misattributed her performance to factors other than lack of ability as a means of attempting to conceal her failure. Greg chose to imply at least partial success whenever possible as his attempted means of concealing failure. Both students frequently engaged in avoidance behaviors if they considered their public image to be at risk.

Chapter VII

SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS FOR FURTHER RESEARCH

Summary of the Study

Purpose

The purpose of the study was to seek some understanding of the causal perceptions and behaviors of four Grade 6 students and their teacher as they relate to the expectancy effect in the classroom. The study focused on questions pertaining to the characteristics of student behavior during the learning of mathematics, the conceptions of self-performance which students appear to develop in achievement-related situations and, from an attributional perspective, the phenomena which characterize teacher expectancy effects. In addition, the study also sought to examine the effectiveness of stimulated recall as a research tool when used in naturalistic settings.

Methodology

Ten consecutive mathematics lessons were videotaped in a Grade 6 classroom for use with follow-up stimulated recall interviews. Four target students reported their interactive thoughts and described their thoughts and feelings pertaining to self-performance in mathematics. The teacher also reported her interactive thoughts. Some pre-performance and post-performance interviews were also conducted.

Overt process data were also obtained from the videotapes. Students' overt behaviors and dyadic interaction behaviors between the teacher and each student were coded.

The research design was intended to yield data which provided insights into the attributional behavior of classroom participants and possibly contribute to an explanation of the expectancy phenomena.

Analysis Techniques

The analysis of the data proceeded in three main phases. Student behavior, both in terms of its overt and covert aspects, was coded according to category systems developed for the research by inductive means. The category system for analyzing student overt behavior and the content analysis system of student interactive thoughts facilitated the quantification of student behavior.

Student self-performance covert behavior was analyzed from an attributional perspective. Causal explanations of student behavior were described according to identified chains of comment. As well, the characteristics of a student's underlying ideas, views, beliefs, emotions, and lines of reasoning were described. From this attributional analysis, a characterization of each student's conception of self-performance was discerned.

Dyadic interactions between each of the students and the teacher were analyzed at the observable level by using a revision of the Expanded Brophy-Good Teacher-Pupil Dyadic Interaction Classroom Observation System. These data, together with the verbal reports of their covert behavior from each of the interaction participants, facilitated an overall analysis of the interactions. Some expectancy phenomena were revealed in this analysis.

A summary analysis for each student was developed to indicate the kinds of relationships found to exist between and among aspects of student achievement-related behavior and teacher behavior.

Descriptions of the Case Studies

A collation of the summary analyses for each student is shown in Table 31. This is intended to provide some bases for the drawing of conclusions in the next section. When presented as significant features of the case studies in relation to the major elements of the analyses undertaken in the study, comparisons between the four students could be made. However, discussions of the perceived comparisons between Tina, Mike, Lisa, and Greg are treated fully in the presentation of evidence leading to the drawing of some of the conclusions and will not be attempted from the information contained in Table 31.

Conclusions

Because the study was limited to the investigation of a small number of student conceptions of self-performance as they relate to the expectancy effect in one Grade 6 classroom, it is not possible to generalize beyond the limits inherent in the study. However, certain conclusions can be reached concerning student behavior in the classroom, the causal explanation of that behavior, and how the explanations of behavior seem to relate to the prevailing performance expectations held by the teacher and the student. The conclusions are presented in the form of answers to the research questions with

Table 31

Collation of Summary Analyses of the Case Studies

Types of Data Analyzed	Case Studies			
	Tina	Mike	Lisa	Greg
Overt Behavior	80% attending-listening. Balance--mainly not attending-listening, especially during teacher-led and student demonstration whole class instruction.	88% attending-listening. Balance--mainly not attending-listening, especially during teacher-led and student demonstration whole class instruction.	85% attending-listening. Balance--mainly interacting with other students, especially during seatwork.	85% attending-listening. Balance--mainly not attending-listening, especially during seatwork.
Interactive Covert Behavior	Mainly self-performance--thoughts and behavioral moves--self. Characterized by positive self-oriented elements.	Mainly self-performance--thoughts. Characterized by task-oriented elements.	Mainly self-performance--thoughts and behavioral moves--self. Characterized by negative self-oriented elements.	Mainly self-performance--thoughts and behavioral moves--self. Characterized by some task-oriented elements and negative personal elements.
Causal Explanations	Mastery-oriented approach to learning; significant success and minor failure attributed to effort; positive affective consequences; often tasks perceived to be easy, because review; tended to avoid public participation for face-saving reasons.	Mastery-oriented approach to learning; significant success attributed to ability, minor failure to effort; often tasks perceived to be easy, because review; usually unemotional; unconcerned regarding public participation.	Learned helpless approach to learning; minor success and failure attributed to effort, frequent significant failure to ability; often intense negative emotions; unclear perceptions of task structure; tended to avoid public participation for face-saving reasons.	Tendency toward a learned helpless approach to learning; minor success and failure attributed to effort, frequent significant failure probably to ability or external factors; negative affective consequences; unclear perceptions of tasks; avoided public participation for face-saving reasons.

Table 31 (continued)

Types of Data Analyzed	Case Studies			
	Tina	Mike	Lisa	Greg
Basic Underlying Covert Behavior	Effort the criterion of success; higher performance self-expectations; aware that teacher held higher performance expectations for her based mainly on effort attribution; aware of classroom achievement hierarchy; report card grade deemed significant.	Higher performance self-expectations based on ability; aware that teacher held higher performance expectations for him based mainly on ability; aware of classroom achievement hierarchy; report card grade deemed significant.	Lower performance self-expectations based largely on ability; recognized effort as the criterion of success but little effort-outcome covariation; perceived that teacher held lower performance expectations for her based mainly on effort; report card grade deemed significant.	Lower performance self-expectations based probably on ability; perceived that teacher held lower performance expectations for him based mainly on effort; recognized that effort was the espoused criterion of success but little effort-outcome covariation; report card grade deemed significant.
Teacher-Student Dyadic Interaction Behavior	Sought to enhance or maintain the teacher's effort-based higher performance expectations in order to achieve good report and protect self-esteem.	Expected and achieved success including a good report; his successful performance sustained the teacher's higher expectations of him.	Sought to gain the teacher's attention to give impression of effort input; attempted to conceal failure-prone performance; tried to protect self-esteem.	Wanted teacher to perceive him as an effort-oriented student; attempted to conceal failure-prone performance; tried to protect self-esteem.

which the study was concerned. A further conclusion concerning differential teacher behaviors for different student performance expectations held by the teacher is also reached.

1. What are the characteristics of students' behavior during a lesson?

a) Categories of student overt behavior

Examination of the video recordings of the Grade 6 mathematics lessons revealed initially a variety of student overt behaviors. Some of these pertained to different postures, varying degrees of attention, varying kinds of distractions, the kinds of ongoing interactions, movements around the room, and so on. Some overt behaviors reflected on-task behavior while others reflected off-task behavior. Some overt behaviors tended to be reported in a descriptive manner because of observer uncertainty as to whether or not they reflected on-task or off-task behavior. As a consequence, student overt behavior was categorized as attending-listening, not attending-listening, interacting with other students, out of desk, and supervised by the teacher.

Therefore, it can be concluded that several categories of student overt behavior could be discerned.

b) Frequency of student overt behaviors

All students were observed to be mainly on-task. Mike was recorded to be attending-listening 88 percent of the time, Lisa and Greg 85 percent of the time, and Tina 80 percent of the time. For the balance of the time, most students were observed to be off-task. Tina was not attending-listening for 14 percent of the time, Greg 10 percent of the time, Mike 11 percent of the time, and Lisa 3 percent of the time. Lisa was observed to be interacting with other students for about 7 percent of all learning time.

Therefore, it can be concluded that a major proportion of the student overt behaviors observed were attending-listening behaviors, a small proportion were not attending-listening behaviors, and other overt behaviors occurred infrequently.

c) Relationships between student overt behaviors and lesson situations

Three broad categories of lesson situations were identified: teacher-led whole class instruction, student demonstration whole class instruction, and seatwork. In all lesson situations the students were observed to be mainly attending-listening. However, differences between the successful students and the less successful students were discerned. Successful students were more likely to engage in not attending-listening overt behaviors during teacher-led and student demonstration whole class instruction. Within this trend the proportions for not attending-listening were higher with Tina and Mike during student demonstration whole class instruction than during teacher-led whole class instruction. Less successful students were more likely to be engaged in behaviors other than attending-listening during seatwork. For Lisa, these other behaviors tended to be interacting with other students, whereas Greg tended to be not attending-listening.

Therefore, it can be concluded that while attending-listening behaviors were prominent in all lesson situations, successful students tended to engage in off-task behaviors more during whole class instruction, whereas less successful students tended to engage in behaviors other than attending-listening during seatwork.

d) Categories of student covert behavior

Examination of the transcripts of the stimulated recall interviews with the students revealed initially a variety of covert behavior which included interactive and non-interactive aspects. Only the interactive thoughts were categorized. A diversity of interactive thoughts were coded according to the broad trends of self-oriented thoughts and feelings, learning of mathematics thoughts, other person-oriented thoughts, feelings in general, and non-task-related thoughts. The nine main categories of student interactive thoughts were subject matter, cognitive processes, behavioral moves--self, behavioral moves--student, behavioral moves--teacher, self-performance --thoughts, self-performance--feelings, feelings, and non-task-related.

Therefore, it can be concluded that several categories of student covert behavior could be discerned.

Within a number of categories of student interactive thoughts, sub-categories were identified to facilitate a more intensive analysis of those thought units relevant to the intentions and directions of the research. The sub-categories tended to separate the objects of, the intentions of, and the nature of the thoughts and feelings pertinent to each category. Those categories which were sub-categorized were behavioral moves--self, behavioral moves--student, behavioral moves--teacher, self-performance--thoughts, self-performance--feelings, and feelings.

Therefore, it can be concluded that several sub-categories of selected categories of student interactive thoughts could be discerned.

e) Frequency of student covert behaviors

All students reported self-performance--thoughts most frequently. These ranged from Greg's 25 percent of all thoughts to Mike's 31 percent. Behavioral moves--self thoughts were the second most frequently reported interactive thoughts by all students, ranging from Mike's 14 percent of all thoughts to Lisa's 23 percent. The third most frequently reported category reported by the students was behavioral moves--student, which ranged from Lisa's 9 percent of all thoughts to Tina's 14 percent. Cognitive processes category of thoughts was reported 14 percent and 12 percent of all thoughts, respectively, by Greg and Mike but only 7 percent and 6 percent, respectively, by Lisa and Tina. Other categories of thoughts which tended to be reported 4 to 10 percent of all thoughts by all students were self-performance--feelings, feelings, behavioral moves--teacher, and non-task-related. Subject matter thoughts were the least frequently reported thoughts, ranging from Mike's 6 percent of all thoughts to Tina's 2 percent.

The self-oriented categories of thoughts, namely, self-performance--thoughts, behavioral moves--self, and self-performance--feelings, accounted for most of all students' thoughts, ranging from Mike's 48 percent to Lisa's 58 percent.

Therefore, it can be concluded that the most frequently reported categories of student interactive thoughts were self-performance--thoughts and behavioral moves--self.

f) Student self-performance covert behavior

The student self-performance--thoughts category was subdivided according to aspects of self-assessment, perception of tasks, self-expectations, and significant others. The most frequently reported interactive thoughts in this category were perceptions of task difficulty and perceptions of task structure, which accounted for 29, 40, 50, and 53 percent, respectively, for Lisa, Greg, Tina, and Mike. Self-assessments of success and of failure thoughts were reported 24, 28, 37, and 40 percent, respectively, of all self-performance thoughts by Mike, Tina, Greg, and Lisa. Self-expectations and self-attributions thoughts ranged from Greg's 13 percent of all self-performance thoughts to Mike's 18 percent. Apart from Lisa's 17 percent of all self-performance thoughts, the sub-category of significant others was reported 10 percent or less by the other three students.

Therefore, it can be concluded that a large proportion of self-performance--thoughts which students reported were perceptions of tasks while a smaller proportion were self-assessments of success and failure.

Self-performance covert behavior also included self-performance feelings. These were reported infrequently by students, ranging from Mike's 3 percent of all interactive thoughts to Lisa's and Greg's 8.5 percent each.

Expressions of anxiety were the most frequently reported emotions, especially by Lisa and Greg. Morally neutral feelings were reported by all students less frequently, while only Tina reported feelings which were sub-categorized as morally unneutral.

Therefore, it can be concluded that a large proportion of self-performance--feelings which students reported were expressions of anxiety, while morally neutral emotions were less frequently expressed.

g) Comparisons between the self-performance covert behavior of high achievement/high motivation students and low achievement/low motivation students

Several comparisons between the self-performance covert behavior of successful students and less successful students can be drawn. Of all self-performance thoughts, perceptions of tasks were reported by the successful students, Mike and Tina, 53 percent and 50 percent, respectively. These percentages of thoughts were higher than Mike's and Tina's 24 percent and 28 percent, respectively, of thoughts reported as self-assessments of success and failure. The less successful students partly reversed this trend in their reported self-performance thoughts. Greg's and Lisa's reported perceptions of tasks accounted for 40 percent and 29 percent, respectively, of all their self-performance thoughts. These were close to or lower than Greg's and Lisa's self-assessments of success and failure thoughts which were reported as 37 percent and 40 percent, respectively, of all thoughts in this category.

Tina and Mike both reported a higher percentage of self-assessment--success thoughts than self-assessment--failure thoughts. Greg and Lisa's self-assessment thoughts reversed this trend with more self-assessments of failure being reported than self-assessments of success.

Other trends in the comparison of the self-performance covert behavior between successful and less successful students were discerned. Mike and Tina, as successful students, reported thoughts referring to self-expectations of 15 percent and 12 percent, respectively, of all self-performance thoughts, but infrequently referred to self-attributions and significant others. Lisa and Greg, as less successful students, reported thoughts referring to significant others of 17 percent and 10 percent, respectively, of all self-performance thoughts, but infrequently referred to self-attributions or self-expectations.

More self-performance feelings were expressed by less successful students than successful students. Both Lisa's and Greg's reported expressions of self-performance emotions accounted for 9 percent of all their interactive thoughts, whereas Tina's and Mike's expressions of self-performance emotions accounted for 4 percent and 2 percent, respectively. Anxiety was the self-performance feeling most frequently reported by Greg and Lisa, with higher proportions of morally neutral negative feelings being experienced as well. Mike and Tina reported very few expressions of anxiety. Their reported self-performance feelings referred to mainly morally neutral emotions.

Therefore, it can be concluded that the successful students, compared with the less successful students, tended to report more perceptions of tasks, more self-assessments of success, and more references to self-expectations; whereas the less successful students, compared with the successful students, tended to report more self-assessments of failure, more references to significant others, and more expressions of self-performance feelings, especially anxiety.

2. What are the conceptions of self-performance that students appear to develop in classroom achievement situations?

   a) The ideas, beliefs, views, emotions, lines of reasoning of a student's conception of self-performance

From the interviews with the students, the researcher endeavoured to gain an impression of the conceptions of self-performance held by each student. The major components of these conceptions were found to refer to several common ideas, beliefs, views, emotions, and lines of reasoning. One obvious component centered on performance, with notions of success and failure and causes of success and failure. Effort was perceived by all students to be the criterion of success, while ability was perceived as a supportive reason. Other causes reported included mood, nature of the task, and teacher's explanation.

Feelings were often expressed by the students in relation to performance. A common emotion reported was anxiety, ranging in degree from a slight concern through worry to fear and despair. Morally neutral emotions such as pleasure, satisfaction, disappointment and boredom, and morally unneutral emotions such as pride, envy and shame were also expressed with references to varying degrees of intensity.

Student perceptions of the tasks occurred frequently. Whether a task was easy or hard and whether the working of a problem was understood or not seemed to be central concerns of the students. Beliefs about the preferred difficulty level of tasks and which facets of the lesson students considered important were other notions identified by students.

All students commented about the achievement hierarchy of students for the learning of mathematics in the classroom. Not only were the relative performance capabilities of other students recognized but, as well, the students reported the cues to which they attended for identifying the achievement places of other students. Each of the four students perceived his or her place in the hierarchy and this related closely to the performance self-expectations held by each student.

All students made frequent referral to the end of unit test and especially the mark on the report card. With three students the mark on the report card tended to be considered in association with the parent(s) and the home. The pervasiveness of the influence of the report card seemed to transcend most self-performance covert behavior.

The teacher's roles in the student's conception of self-performance seemed to be crucial. Most of the students expressed concern about what the teacher thought of them. They were anxious that the teacher held as high performance expectations for them as possible. All students perceived the teacher valued effort as the criterion of success. They all perceived the teacher to be the person who distributed the report marks.

Fear of failure was reported both directly and indirectly by most students. This usually was associated with self-esteem. Fear of public failure, which could involve being laughed at by peers or diminuition of the teacher's impression of himself, tended to result in the student engaging in what Goffman (1967) referred to as face-saving tactics. Fear of private failure and its potential effect on the report card created further pressure on a student's performance. Hope of success was seldom reported by the students.

Therefore, it can be concluded that a student's conception of self-performance tended to include the following components: notions of success and failure and their causal determinants of mainly effort and, to a lesser extent, ability; emotion of anxiety and, to a lesser degree, a range of affective states; perceptions of tasks; perceptions of performance self-expectations and the achievement hierarchy of the classroom; mark on the report card; teacher's performance expectations of the student; and fear of failure.

b) The relationships among the ideas, beliefs, views, emotions, and lines of reasoning of a student's conception of self-performance

From the components of the students' underlying self-performance covert behavior several relationships were discerned. The most pervasive relationship seemed to pertain to what Doyle (1978) referred to as the performance-grade exchange. Students seemed desirous of successfully completing tasks in the most efficient manner possible in order to place themselves in an advantageous position for gaining a good mark on the report card. Of necessity, students perceived the teacher to be the mediating influence in achieving this goal and they tended to adapt their behavior with a view to presenting themselves favorably.

An associated relationship was the students' approach to learning. All students accepted that effort was the espoused criterion of success and consequently expended effort accordingly. However, while two of the students realized the desired outcomes for their effort expenditure, the other two students perceived little or no effort-outcome covariation. As a consequence, those who achieved their goal adopted a mastery-oriented approach to learning, while those who failed to achieve their goal tended to adopt a learned helpless approach to learning.

The approach to learning adopted by the student tended to be a function of his perception of the task. Where the task was perceived by the student to be easy and the means by which to complete the task clearly understood, the student tended to be mastery-oriented. If the student perceived the task to be difficult and the means of completing it were not understood, then the student tended to be learned helpless.

Perceptions of success and failure seemed to be associated with positive and negative emotions, respectively. These feelings were the more intense when associated with public performance and with significant performance, such as the unit test.

Perceptions of other students' behavior and performance appeared to be used by the student for comparing his own behavior and performance. These comparisons seemed to contribute to the kind of performance self-expectations formed and held by the student.

Performance self-expectations were generally based on a self-perceived causal factor. Mike tended to base his self-expectations on ability, whereas Tina perceived effort to be the underlying cause. Lisa and Greg, both less successful students, referred to effort frequently but there were indications that they also based their performance self-expectations on ability.

Whether or not a student wished to participate publicly seemed to reflect a relationship with the student's perceived public image. Mike's level of self-esteem enabled him to participate publicly as easily and readily as he participated privately. Intervening factors seemed to be involved with the other three students who engaged in what Goffman (1967) referred to as various kinds of face-work. Tina and Lisa, to a varying degree, were concerned with enhancing the teacher's impression of themselves at the same time as risking the embarrassment of public failure. Greg was particularly concerned with protecting his public image, hence he adopted avoidance tactics.

Therefore, it can be concluded that a student's conception of self-performance tended to include the following relationships among and between the components: the performance-grade exchange; the approach to learning; the perceptions of the tasks and the approach to learning; performance and emotions; other student performances and self-expectations; self-expectations and attributions of performance; and public participation and personal status.

c) The origins of these beliefs, views, emotions and lines of reasoning of a student's conception of self-performance

The evidence suggested that the nature of a Grade 6 student's conception of self-performance reflected the background of the student and his previous school experience. Two related pivotal notions seemed to be involved. The "all important" grade on the report card appeared to link directly the student's classroom performance and the home. Students tended to want a good report mark to satisfy the expectations of the parent(s). Society, including the parent, the teacher, other students, and the self, espoused effort expenditure as the major criterion for achieving this good report mark. Where effort-outcome covariation was perceived by the student in the past, so his conception of self-performance was developed accordingly. Mike's and Tina's conceptions were characterized by success and positive feelings, while Lisa's and Greg's conceptions were characterized by failure and negative feelings. Their current view of the performance arena of the classroom appeared to be shaped from perspectives derived from previous grades on the report card and the associated parental reaction to them.

Therefore, it can be concluded that the nature of a Grade 6 student's conception of self-performance tended to originate largely from previous report card performance and its associated causal criterion of effort.

d) Causal perceptions of success and failure and conceptions of self-performance

Tina accepted the effort criterion of success, whereas Mike attributed his significant success largely to higher ability. Where he succeeded with learning which he perceived to be easy, Mike attributed his performance to review or familiarity with the subject matter. While apparently not experiencing significant failure, Mike attributed his infrequent and minor failures to lack of effort. Mike appeared to be uninvolved emotionally and unconcerned about other students in the classroom. As a consequence, his conception of self-performance was very task oriented.

Tina's conception of self-performance tended to involve more personal elements. She was concerned about her public image and strived to be viewed as an effort-conscious student. She attributed her significant successes to effort but her routine successes to a combination of effort and ease of task, especially if it was review. Tina attributed her infrequent and minor failures to lack of effort.

Lisa and Greg attributed their failures initially to lack of effort. However, both perceived other factors to be involved. Lisa reported lack of ability and Greg inferred lack of ability as the reason for not achieving the outcome expected from the amount of effort expended. Both students' conceptions incorporated personal elements, especially in terms of face-saving tactics as mechanisms for retaining some level of self-esteem. A component of these face-saving tactics appeared to involve misattributions. Lisa and Greg seemed to want to avoid attributing their failure to lack of ability by attributing it to lack of effort, mood, or external factors. Where Lisa and Greg experienced success, they both attributed this mainly to effort and partly to task difficulty.

Therefore, it can be concluded that causal perceptions of success and failure influenced significantly student conceptions of self-performance.

e) Characteristic qualities of a student's conception of self-performance

From the discussion to this point it has been possible to discern some overall qualities of a student's conception of self-performance. The drive or motive of the report card appeared to be salient. This seemed to be linked to the student's approach to learning which, in turn, gave rise to the particular emotions experienced. The student's causal explanation of his performance seemed to influence the manner by which he behaved in the classroom. These behavioral reactions tended to reflect the nature and level of self-esteem of the individual student.

The set of qualities which appeared to be characteristic of a student's conception of self-performance seemed to resemble, in a generalized form, the causal framework for the chains of comments referred to in the attributional analysis of behavior. The expression of a cognition tended to be accompanied by the expression of an emotion. The subsequent causal explanation of behavior tended to reflect some underlying idea or belief, and often gave rise to the adoption of some consequent behavior.

Therefore, it can be concluded that the characteristic qualities of a student's conception of self-performance appeared to be attributionally based.

3. From an attributional perspective, what phenomena characterize the expectancy effect?

a) Causal perceptions of students and their effects on achievement behavior

The causal perceptions of performance by the successful students, who were described as mastery-oriented, were reported earlier. In relation to achievement behavior, whenever Tina and Mike experienced failure they simply applied more effort to the task and, as a result of this persistent behavior, achieved the desired outcome. They approached all tasks, including the unit test, confident of success, and usually sustained a prolonged intensity of effort until the tasks were completed.

The causal perceptions of performance by the less successful students, who were described as learned helpless, were also reported earlier. Both Lisa and Greg, when faced with a difficult task, persisted for a time, then gave up. While they often approached their routine assignments readily, on some occasions they were hesitant. This hesistancy was more profound when approaching the unit test. Both students viewed the test as an anxiety-loaded task. During assignments, both Lisa and Greg tended to be less intense in their work effort and were more likely to be engaged in behaviors other than attending-listening. This appeared to be related to their perceptions of the task.

Therefore, it can be concluded that a student's achievement-related behavior is determined by his causal perceptions of success and failure.

b) The relationship between teacher's behavior and students' causal perceptions

The evidence from the four case studies indicated that the students were aware of the performance expectations which the teacher held for them. Furthermore, the students perceived the bases by which the teacher formed and maintained the expectations. Mike perceived the teacher's high performance expectations of him were based largely on his higher ability. Tina perceived the teacher's higher performance expectations of her were based on her expenditure of effort. With both students, some of the teacher's instructional moves conveyed to them the teacher's expectations held toward them. The amount of extra time given to other students during seatwork and not to them, and the selective use of students to publicly participate were examples of this. Both the successful students recognized the value the teacher held towards effort. Tina often pretended to give the impression of attending at times when the lesson became dull in order to maintain her perceived image of an attending student. Overall, the teacher's behaviors reinforced the successful students' attributions of performance to effort and ability.

Both Lisa and Greg recognized the value placed on effort by the teacher and both perceived the teacher's lower performance expectations held toward them were based on attributions to insufficient effort. For example, Lisa sometimes perceived the teacher to criticise her performance. Because she had exerted considerable effort, Lisa attributed her lower achievement to factors other than effort, namely, lack of ability. Greg, in recognizing the teacher's behaviors as espousing effort, also faced dilemmas when he expended much effort for little return. He sought to attribute the cause of failure to factors other than effort. These situations indicated that teacher behaviors which extolled the virtues of effort often resulted in the less successful student attributing his failure of performance to lack of ability or, occasionally, to other external factors.

Lisa and Greg were also aware of the teacher's differential behaviors when interacting with other students. Selective use of some students to respond to different questions and even the number of response opportunities offered to some students were recognized by the less successful students during whole class instruction. The overall effect on Lisa especially, and to a lesser extent on Greg, was an awareness of their ranking in the achievement hierarchy of the classroom.

Therefore, it can be concluded that students' causal perceptions of success and failure were influenced by teacher behaviors which extolled the virtues of effort and by differential behaviors when interacting with students.

c) Causal perceptions by teachers and their effect on behavior toward students

The evidence suggests that the teacher's higher performance expectations for the successful students were based largely on ability and some effort for Mike, and largely on effort for Tina. Perceiving Mike to be a student of higher ability resulted in the teacher often calling upon him when she wanted to change the pace or the direction of a lesson. She found she could always rely on Mike to contribute or demonstrate the significant idea during discussion. She seldom interacted with him privately. With Tina, the teacher perceived a student who needed very little help with her work. Consequently, when Tina did ask for help the teacher felt sure that the problem would be minor and that Tina would already have expended considerable effort in an attempt at a solution. She tended to make the assumption that Tina would "catch on" to the merest clue.

The teacher's lower performance expectations for Lisa appeared to be based largely on ability, whereas for Greg they were based largely on effort. Because the teacher was aware of Lisa's learning problem she tended to provide compensatory behaviors. She frequently interacted with Lisa, helping her to understand directions and often worked through an example of a problem with her. However, the teacher later began to suspect part of Lisa's problem to be a lack of effort. Teacher feedback containing criticism was only coded following this comment by the teacher. With Greg, the teacher seldom interacted privately but when this occurred it was largely intended for checking his progress. On occasions she felt it necessary to check whether or not Greg had been attending.

The teacher differentiated her behaviors toward the lower performance expectation students according to her causal perception of their failure. Where she perceived failure to perform was based on a stable factor, as in Lisa's case, she provided additional academic support. However, with Greg, to whom she attributed failure largely to the unstable cause, her behavior was less academically oriented and more attention-demanding in nature.

Therefore, it can be concluded that the teacher's differential behavior toward students seemed to be determined by her causal perception of their success and failure.

d) Consensus between the teacher and student regarding the causal perceptions of the student's successes and failures.

Four sets of causal perceptions were observed to prevail in the learning situation: the student's causal perceptions of his performance; the student's perception of the teacher's causal perceptions of the student's performance; the teacher's causal perceptions of the student's performance; and the teacher's perception of the student's causal perception of his performance. With Mike there appeared to be consensus with all sets that his performance was attributable largely to ability and some effort. Similarly, all sets of causal perceptions attributed Tina's performance largely to effort.

Therefore, it can be concluded that, for the successful students, a consensus was found between the teacher and the students regarding the causal perceptions of the students' performances.

With Lisa, failure was perceived by her to be attributable largely to lack of ability. However, she perceived that the teacher attributed her lower performance to lack of effort. The teacher meanwhile attributed Lisa's failure to ability. While no direct evidence was found as to what the teacher perceived Lisa attributed her failure, the discrepancy in causality seemed to exist with Lisa's interpretation of the teacher's behavior. With the teacher beginning to modify her impression of causality toward lack of effort, Lisa's interpretations probably will be reinforced.

Greg perceived his failure to be attributable to factors other than effort, probably lack of ability. In his view, the teacher perceived his failure to be caused by insufficient effort. The teacher did perceive Greg's performance to be attributable largely to lack of effort but perceived that Greg attributed his failure performance to lack of ability. Both Greg and the teacher perceived the other's attributions of Greg's performance correctly, but lack of consensus in the ascription of failure generated the pressure in the learning situation. Greg perceived the teacher to be in the power role and so adopted a passive profile. The teacher perceived Greg as a quiet student who seldom participated and was, therefore, inclined to be distracted.

Therefore, it can be concluded that, for less successful students, a lack of consensus was found between the teacher and the students regarding the causal perceptions of performances.

To the researcher, the variation in consensus of attribution of performance for successful and less successful students constituted one probable explanation of the expectancy effect. Variations in teacher behaviors and in student behaviors appeared to be based on this central point.

Therefore, it can be concluded that the issue of consensus between the teacher's and students' causal perceptions of student performance was a key mechanism in the explanation of the expectancy effect.

4. How effective are stimulated recall procedures when used as a research technique for observing the covert behavior of classroom participants?

a) Difficulties or problems in the use of stimulated recall methodology

The use of stimulated recall methodology with elementary school students was a comparatively new venture. Not surprisingly, a number of problems and difficulties arose in the course of the study.

The research design contained a familiarization phase and most aspects of this phase which pertained to stimulated recall proceeded as planned. The technical difficulties were overcome, the obtrusive effects of the presence of the researcher and the video recording equipment were reduced, the selection of target students accomplished, and the establishing of rapport between the researcher and the target students was undertaken. This included the researcher, of necessity, having to learn the Grade 6 vernacular. However, an unforeseen difficulty was one which focused on the unusual experience for students to discuss and report to an adult thoughts about their beliefs, ideas, and values which pertained to their performance in the classroom. The rehearsals overcame this problem to some extent for two of the students but it was not until several days had passed in the data gathering phase that the researcher became aware of an increase in the research value of the other two students' reports of their self-performance covert behavior. While the researcher had been alerted to the need for choosing students who were more verbal and chatty and who were audible on a cassette tape, the experience seemed to suggest taking account of this further individual difference variable of conversing about the self with an adult.

The researcher, as interviewer, was attentive to the need to use mainly neutral questions and comments in eliciting student verbal reports of covert behavior. Because of the intentions of the study, the researcher used some leading questions when the student's recall of thoughts seemed complete. The researcher found, however, that withholding the use of leading questions during the stimulated recall sections of the interviews became difficult with two of the students who tended to recall brief thoughts.

Interviewee preparation was considered very important. The researcher now believes that the details of interviewee preparation, as outlined in Appendix B, should be undertaken with each student before each interview. While students differ in the need for this preparation, some discussion before each interview appears to be necessary. The researcher was surprised at the few occasions in which students stated they could not recall their interactive thoughts.

Most mathematics lessons were of 45 to 60 minutes duration. The lessons were too long for students to sit and recall thoughts; the researcher found that after 30 minutes the effectiveness of the stimulated recall interview diminished. Therefore, 30 minutes would appear to be an upper time limit for interviews with Grade 6 students. Such a limit would be helpful given the concern of withdrawing a student from the regular classroom learning sessions for the interviews.

Therefore, it can be concluded that with certain refinements few, if any, major problems exist in the use of stimulated recall methodology with Grade 6 students.

b) The potential of the stimulated recall methodology for investigating student interactive thoughts

The immediate feature observed about student interactive thoughts was their tendency toward brevity. Students recalled initially only a few thoughts at each stimulus point and often these appeared to be unsophisticated in substance. Usually students would focus on a single idea which they might describe briefly. Only on some occasions would student verbal reports in responses to the researcher's question extend beyond six sentences. Nonetheless, student interactive thoughts tended to be coherent, logical, and readily applicable to content analysis. The data derived can be described as rich, interesting and extensive in scope. They appeared to reflect the full range or array of thoughts experienced by the student during the lesson.

Students reported without hesitation interactive thoughts which ordinarily one might have deemed indiscreet or embarrassing to the student. Their reports reflected a spontaneity and candidness which initially had been unexpected. However, the richness of the data diminished when the mood of the student was not appropriate for the needs of the interview. This seemed to occur rarely given the number of interviews conducted over the 10 day observation phase.

Therefore, it can be concluded that the potential of stimulated recall methodology for investigating student interactive thoughts appeared to be profound though, as yet, not fully realized.

5. The teacher's covert behavior which pertained to performance expectations of the students

From the stimulated recall interviews conducted with the teacher, several general comments about the teacher's performance expectations of students were derived from the data. These included her views about the class overall, an awareness of her use of differential behaviors with different students, her potential to modify performance expectations of individual students, and her views of the teaching-learning process as they pertained to expectations.

The teacher did compare the class this year with the Grade 6 she taught at another school the previous year. She commented that the class consisted of varying degrees of ability and so the progress through the curriculum guides was expected to be slower. The students were perceived to vary markedly in their familiarity with the unit topic of motion geometry; it was either review or new material. However, she wanted the class to proceed as a total group. When the unit test results were revealed the teacher reported that the students who scored low were expected because their work had been careless throughout the lessons. Some good students were observed to have not achieved as well as expected, while other students surprised her with their good results.

In the course of teaching the teacher was aware of some differential use of process teaching behaviors for different students. Often when she wanted to change the pace of the lesson or redirect it back to her preconceived plan, the teacher reported calling upon students whom she perceived or presumed would provide the desired response. Alternatively, when the teacher wanted to reinforce an idea she reported calling upon students whom she perceived or presumed would provide an incorrect response. Through use of process feedback to these students, the teacher believed she might be clarifying the point for the benefit of the whole class. The teacher also reported her awareness of definitely changing her pace of speech and development of idea according to her views of the student's performance capability. She was aware that under the normal pressures of teaching she often only chose volunteer students to respond. Because of this the teacher later realized that some students did not publicly participate in the lesson. Finally, with some students, the teacher was aware that any difficulty they perceived to experience with their work was usually in the order of needing an assurance that they were "on track." Consequently, she adopted differential behaviors according to whether or not this observation might be valid for each individual student.

The teacher reported that she often found herself modifying her opinions of students according to her current perceptions of their performance. One student whom she expected to perform well performed poorly. She perceived no slackening in his effort input, hence she became concerned about the reason for this drop-off in performance. When it became known that the student was bothered by geometry the teacher reported being relieved. Her original attribution of his performance to ability and effort remained intact for she now explained away his poor performance to nature of the task, an external factor. The teacher twice reported that when she perceived a student to be "on the ball" early in the lesson she endeavoured to encourage this unexpected behavior. Finally, the teacher did report holding a student in mind when she was marking the test, although she believed this did not sway her marking at contentious points.

The teacher expressed some views of teaching-learning as they pertained to student performance expectations. Both direct and indirect evidence was obtained that the teacher placed a high value on effort. Her behavior when returning test results confirmed the evidence. The teacher's justification to the students for announcing the names of those who obtained the highest marks was to recognize the considerable attention and listening undertaken by the students throughout the lessons.

The teacher often expressed a sensitive concern about her behavior in relation to the students. She reported that she did not like to think any student thought that she had ignored him. Likewise, she endeavoured to take care to avoid referring to the relationship between activities and happenings in the classroom and test results and report cards.

Therefore, it can be concluded that the teacher was aware of her performance expectations held towards students and was aware accordingly of some differential process behaviors for different students.

Implications for Teaching and Learning

The implications of this study of the conceptions of student self-performance and the expectancy effect seem to be numerous. The four case studies presented underline the uniqueness and idiosyncracies of each individual classroom participant. Each student is a different human being engaged in the process of learning and, especially, in just being a person. By viewing the achievement-related situation of the regular functioning classroom through different students' eyes, several insights emerged which should have implications for teaching and learning. While these realizations may not necessarily reflect anything new educationally, they do emphasize basic aspects of human functioning in the learning process which may have been overlooked in the drive for superior curricula and advanced instructional techniques.

The evidence from the study would indicate that the society, the school, the home, and even the individual students espoused effort as the overriding criterion for success. The adage seemed to exist that so long as anyone worked hard they would achieve success. Parents, the teacher, and the individual students accepted the notion that the quality of the outcome derived depended on the amount and kind of effort expended. Where effort and outcome tended to covary for a student, that student appeared to experience positive self-performance feelings and functioned in a success-oriented climate. However, where effort and outcome tended not to covary for a student, that student appeared to experience negative self-performance feelings and functioned in a failure-oriented existence.

The successful students appeared to view their outcomes as upholding the generally high value placed on effort. The less successful students tended to find themselves in a dilemma. They believed that they had exerted all possible effort, yet the societal value had not been realized. The study would support the effort expenditure, for it provided evidence that less successful students were attending-listening as much as, if not more than, the successful students. In addition, less successful students perceived both directly and indirectly that the teacher and other students attributed their failures to insufficient effort. Inevitably, the less successful student attributed his failure to factors other than effort, usually lack of ability. The situation for less successful students, therefore, appeared to be educationally bleak.

The implications for teaching and learning in this situation seemed to focus upon the nature of the tasks. The study indicated that the less successful students were motivated to learn but often found the task beyond them. Despite considerable effort, these students were unable to perceive tasks to be structured as ones which they could solve by their own efforts and abilities. Had the tasks been clearly perceived by the less successful students, there seemed every reason to expect that effort-outcome covariation would have followed. The implication for teaching, therefore, would be one of adapting instructional tasks to meet the task perception needs of the various students in the classroom. If the tasks were perceived to be manageable by all students then the espousing of the effort criterion of success would seem to be more appropriate.

In situations where all students in the class were learning the same material at the same rate at the same time, both the successful students and the less successful students were disadvantaged. The successful students viewed the tasks as usually easy, usually review from previous years, and expressed boredom and disappointment. The continued, long term effect of these views might result in negative attitudes to learning. The less successful students were disadvantaged for the different reasons described earlier.

By accommodating differing student success thresholds through the adaptation of instructional tasks, teachers would be obliged to accept the notion of students functioning at differing levels of ability. An eclectic approach to instruction in the regular classroom might be one means of achieving this. The successful students would be appropriately challenged, while the less successful students would experience more success which they could attribute to effort rather than to factors other than effort.

The study revealed that all students were willing to work and learn at school. The report card seemed to be the motivating factor. In a sense, the pervasiveness of the report card in the thoughts of students was surprising, yet it confirmed Doyle's (1978) study which referred to the performance-grade exchange character of the classroom. Successful students were very keen to retain their good marks on the report, while less successful students were very keen to improve their report card marks. In three of the four cast studies the researcher detected that either subtle or direct pressure was exerted from the home for the student to achieve a good mark.

The report card seemed to be the ultimate though seldom visible goal of student behavior in the learning process and the implications of this for teaching seemed far-reaching. The purpose of the report card may need to be questioned. Students were aware that the taking of a unit test was directly related to the report card, therefore, the purpose of tests also may need to be reviewed. In addition, students expressed concern about what the teacher's impressions of them might be. All students saw the teacher as the person who distributed the marks on the report cards and consequently appeared to deem it necessary to impress the teacher. Evidence showed that the students' intentions were to enhance their report card prospects. While teachers and administrators would most likely emphasize that elementary classroom learning is designed for higher goals, the reality of three students' conceptions of the goal of learning cannot be overlooked.

The study indicated that a student's feelings of self-esteem mediated his achievement-related performance. Where these feelings were positive, then the student tended to perform with success. Student self-esteem attributed to high ability seemed, for the student, to be related to more confidence and greater immunity from emotional concerns and awareness of other students than when student self-esteem was attributed more to effort.

Low levels of self-esteem seemed to be associated with face-saving tactics. The study indicated that misperceptions and misattributions by the teacher and less successful students tended to occur when a student was engaged in protecting his self-image. In the normal hustle of a regular classroom the teacher tended to make judgements about student behavior and performance based on insufficient information. Reference to stereotyped explanations tended to result in inappropriate teacher behavior. Where the teacher did have full information she acted appropriately. The implication for teaching is one of becoming aware that a causal explanation normally can be found for most if not all student behavior. Hopefully this study has provided insight into some of the causes of student behavior which, in turn, could add to the information base which teachers might use in their decision making.

A great deal of literature has been presented about teacher performance expectations of students and how these might be "communicated." This study showed clearly that students are aware of the performance expectations which teachers hold toward them. Furthermore, the students accurately perceived the attributional basis of those expectations. The study also indicated that students engaged in behaviors which were designed to preserve or enhance the performance expectations which the teacher held towards them and there was evidence which suggested that not only did these behaviors succeed, but students perceived them to succeed. Such an all-round degree of awareness by the student might surprise teachers, especially those who are sensitive and strive to be fair. Students tended to be very active classroom participants even though outwardly they may spend much time seated passively in a desk.

However, the findings illustrate the importance of the social psychological dimensions of classrooms in a student's mind. The nature and extent of student interactive thoughts which focus on self-performance considerations compared to subject matter and learning considerations may need to be taken into account more by teachers. Teachers need to be well versed in the prevailing group processes of classrooms and this also has implications for teacher education programs.

Finally, the impression is gained from the study that classroom life for successful students is more happy, more positive, and more conducive to learning than it is for less successful students. The evidence to support this impression was both varied and extensive. Less successful students experienced personal and learning pressure, complete with intensity of feelings, to a degree virtually unknown or not experienced by the successful students. The reasons for the situation appeared to range from the less successful students' inability to feel relaxed with the subject matter to perceptions of ability differences among students. While the teachers in most classrooms may be unaware of the scale of the problem, a very real need seems to exist for less successful students to be relieved of some of the personal and learning pressure. Teaching behaviors which accentuate the achievement hierarchy of the classroom appear to contribute directly to this pressure. The implications for teaching seem considerable, for teachers wishing to redress the situation may have to revise significantly many cherished and long held behaviors and ideas.

Recommendations for Further Research

This study was exploratory in the sense that attempts were made to describe students' conceptions of self-performance and, through an attributional analysis, hopefully to arrive at contributory explanations of the expectancy effect phenomena. Very little is known about student thought processes during learning, especially interactive thoughts concerning self-performance. The research line has considerable scope for development and this study seems to suggest numerous directions for further inquiry. Some of the directions recommended are presented below.

Student Interactive Thoughts

1. Student interactive thoughts in a normal classroom are only becoming known. How students process information while learning and how they integrate this with conceptions of self-performance could contribute to theories of learning and teaching.
2. The study has revealed that self-oriented thoughts and feelings form a significant component of student interactive thoughts. This data base, however, is precariously thin and a real need exists for replication studies across grade levels, across subject matter, and across student ability levels.
3. The origins of student conceptions of self-performance would appear to be significant for teachers and counselors. This study was able to indicate some very general trends, hence the need for a detailed study of how students developed the conception of self-performance which they have acquired.

4. The study indicated certain components of the student's conception of self-performance were viewed to be more significant than others. An investigation of which hierarchy of components was associated with which kind of student should prove helpful for teachers.
5. No attempt was made in this study to investigate the comparative characteristics of student conceptions of self-performance on criteria other than successful and less successful students. Other variables, such as sex and socio-economic status, may reveal variations of a different order.
6. The impact of success and failure on students seemed to vary. The bases and origins of these variations should be worth investigating for they might provide an important information base to teachers in their decision making related to feedback behaviors.
7. Student emotions, though a corollary to a number of other factors, appeared as a significant component of student interactive thoughts. Extensive studies into the impact of this intervening variable could help teachers to better monitor the emotional health of students and the influence on student emotions of teacher behaviors.
8. The significance of students' conceptions of self-performance on their learning probably cannot be overlooked. A study which would investigate relationships between student product measures and student conceptions of self-performance may provide more realistic causal explanations of student performance which, in turn, might suggest more appropriate instructional directions.

9. Goffman (1967) has elaborated on face-work and this study found evidence that self-protective tendencies of this kind were adopted by students. Detailed analysis of the reasons underlying the use of these tendencies, the different kinds of tendencies adopted and the impact on student behavior of continued use of self-protective tendencies could help teachers to better understand the effects of some of their teaching behaviors.

Teacher-Student Dyadic Interactions

Dyadic interactions seem to be crucial in the "communication" of performance expectations. From the episodes described in this study, a micro-analysis of many episodes should yield rich and valuable explanatory data. A need exists for longitudinal analysis of teacher-student dyadic interactions over an extensive time period and across a number of subject areas. Such an analysis might reveal a greater array of subtle behaviors and intentions of both the teacher and student, for these seem to hold the clues in the transmission of interpersonal impressions.

The dyadic interaction episodes between the teacher and the student seemed to be fraught with misperceptions and defensive attributions. A detailed study of these behaviors may help teachers to become more aware of the reasons underlying a student's behavior.

The conclusion was reached in the study that the issue of consensus between the teacher's and the student's causal perceptions of the student performance was probably a crucial point in the explanation of the expectancy effect. For such a conclusion to be accepted in a general form, more investigation of the consensus issue is recommended.

The Teacher's Interactive Thought Processes

This study has emphasized the student perspective of the interaction process of the expectancy effect. Student conceptions of self-performance, including performance self-expectations, are now viewed to be significant elements of the interaction process. A study which examined closely the teacher's covert behavior in relation to the interaction process would seem necessary. No attempt at an explanation of the expectancy effect would seem to be complete without such a study.

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APPENDICES

APPENDIX A

THE INTELLECTUAL ACHIEVEMENT RESPONSIBILITY SCALE

THE INTELLECTUAL ACHIEVEMENT RESPONSIBILITY SCALE

The Intellectual Achievement Responsibility Scale (IAR) developed by Crandall, Katkovsky, and Crandall (1965) provides a measure of student locus of control. The IAR contains two sets of questions; half pertain to attributions of responsibility for success (I+) and half to attributions for failure (I-). The total IAR score is a composite of internal attributions for both success and failure.

The IAR Scale

1. If a teacher passes you to the next grade, would it probably be
____ a. because she liked you, or
I+ ____ b. because of the work you did?

2. When you do well on a test at school, is it more likely to be
I+ ____ a. because you studied for it, or
____ b. because the test was especially easy?

3. When you have trouble understanding something in school, is it usually
____ a. because the teacher didn't explain it clearly, or
I- ____ b. because you didn't listen carefully?

4. When you read a story and can't remember much of it, is it usually
____ a. because the story wasn't well written, or
I- ____ b. because you weren't interested in the story?

5. Suppose your parents say you are doing well in school. Is this likely to happen
I+ ____ a. because your school work is good, or
____ b. because they are in a good mood?

6. Suppose you did better than usual in a subject at school. Would it probably happen
I+ ____ a. because you tried harder, or
____ b. because someone helped you?

7. When you lose at a game of cards or checkers, does it usually happen
____ a. because the other player is good at the game, or
I- ____ b. because you don't play well?

8. Suppose a person doesn't think you are very bright or clever
I- ____ a. can you make him change his mind if you try to, or
____ b. are there some people who will think you're not very bright no matter what you do?

9. If you solve a puzzle quickly, is it
____ a. because it wasn't a very hard puzzle, or
I+ ____ b. because you worked on it carefully?

10. If a boy or girl tells you that you are dumb, is it more likely that they say that
____ a. because they are mad at you, or
I- ____ b. because what you did really wasn't very bright?

11. Suppose you study to become a teacher, scientist, or doctor and you fail. Do you think this would happen
I- ____ a. because you didn't work hard enough, or
____ b. because you needed some help, and other people didn't give it to you?

12. When you learn something quickly in school, is it usually
I+ ____ a. because you paid close attention, or
____ b. because the teacher explained it clearly?

13. If a teacher says to you, "Your work is fine," is it
____ a. something teachers usually say to encourage pupils, or
I+ ____ b. because you did a good job?

14. When you find it hard to work arithmetic or math problems at school, is it
I- ____ a. because you didn't study well enough before you tried them, or
____ b. because the teacher gave problems that were too hard?

15. When you forget something you heard in class, is it
____ a. because the teacher didn't explain it very well, or
I- ____ b. because you didn't try very hard to remember?

16. Suppose you weren't sure about the answer to a question your teacher asked you, but your answer turned out to be right. Is it likely to happen
____ a. because she wasn't as particular as usual, or
I+ ____ b. because you gave the best answer you could think of?

17. When you read a story and remember most of it, is it usually
I+ ____ a. because you were interested in the story, or
____ b. because the story was well written?

18. If your parents tell you you're acting silly and not thinking clearly, is it more likely to be
I- ____ a. because of something you did, or
____ b. because they happen to be feeling cranky?

19. When you don't do well on a test at school, is it
____ a. because the test was especially hard, or
I- ____ b. because you didn't study for it?

20. When you win at a game of cards or checkers, does it happen
I+ ____ a. because you play real well, or
____ b. because the other person doesn't play well?

21. If people think you're bright or clever, is it
____ a. because they happen to like you, or
I+ ____ b. because you usually act that way?

22. If a teacher didn't pass you to the next grade, would it probably be
____ a. because she "had it in for you," or
I- ____ b. because your school work wasn't good enough?

23. Suppose you don't do as well as usual in a subject at school. Would this probably happen
I- ____ a. because you weren't as careful as usual, or
____ b. because somebody bothered you and kept you from working?

24. If a boy or girl tells you that you are bright, is it usually
I+ ____ a. because you thought up a good idea, or
____ b. because they like you?

25. Suppose you became a famous teacher, scientist or doctor. Do you think this would happen
____ a. because other people helped you when you needed it, or
I+ ____ b. because you worked very hard?

26. Suppose your parents say you aren't doing well in your school work. Is this likely to happen more
I- ____ a. because your work isn't very good, or
____ b. because they are feeling cranky?

27. Suppose you are showing a friend how to play a game and he has trouble with it. Would that happen
____ a. because he wasn't able to understand how to play, or
I- ____ b. because you couldn't explain it well?

28. When you find it easy to work arithmetic or math problems at school, is it usually
____ a. because the teacher gave you especially easy problems, or
I+ ____ b. because you studied your book well before you tried them?

29. When you remember something you heard in class, is it usually
I+ ____ a. because you tried hard to remember, or
____ b. because the teacher explained it well?

30. If you can't work a puzzle, is it more likely to happen
I- ____ a. because you are not especially good at working puzzles, or
____ b. because the instructions weren't written clearly enough?

31. If your parents tell you that you are bright or clever, is it more likely
____ a. because they are feeling good, or
I+ ____ b. because of something you did?

32. Suppose you are explaining how to play a game to a friend and he learns quickly. Would that happen more often
I+ ____ a. because you explained it well, or
____ b. because he was able to understand it?

33. Suppose you're not sure about the answer to a question your teacher asks you and the answer you give turns out to be wrong. Is it likely to happen
____ a. because she was more particular than usual, or
I- ____ b. because you answered too quickly?

34. If a teacher says to you, "Try to do better," would it be
____ a. because this is something she might say to get pupils to try harder, or
I- ____ b. because your work wasn't as good as usual?

Validity and Reliability

Crandall et al. (1965:100) are cautious in their statements of validity and reliability. Modest reliability correlations are presented, namely, test-retest correlation of 0.65 and internal consistency correlation of 0.60 for students in the grade six range. However, Crandall et al. (1965:107) could only provide what they describe as significant but low construct validity correlations in the 0.20-0.30 range for the same students. Despite these data and other supporting psychometric findings as summarized by Lefcourt (1976:69-71), the IAR is frequently used in educational and psychological research, probably more so than other similar scales such as Battle and Rotter's (1963) Children's Picture Test of Internal-External Control and the Nowicki-Strickland Locus of Control Scale (Nowicki & Strickland, 1973).

APPENDIX B

GUIDELINES FOR STIMULATED RECALL INTERVIEWS

GUIDELINES FOR STIMULATED RECALL INTERVIEWS

The guidelines for stimulated recall interviews were adapted from those developed by C. Cooper (1978) and Marland (1977).

Discuss with the Student the Goals of the Research

Little is known about the student's thought processes during instruction. The goal of this research is to find out the thoughts, feelings, moment-to-moment reactions and perceptions of the student during the instructional process (that is, cognitive interaction, classroom events, math content, instructional strategies, the teacher, the class, etc.). Viewing the videotape of the lesson facilitates recall of thoughts and feelings. Since individual student talk constitutes such a minor portion of classroom interaction, even the most perceptive observer cannot detect his/her emotional and intellectual reactions to classroom events; nor can the student's enjoyment of the lesson, understanding of the content and awareness of many classroom events always be inferred from his/her verbal and non-verbal behavior.

It is considered that a study of these processes could yield insights which would assist in the development of theories of instruction which in turn could lead to the improvement of teacher education programs.

How well the student behaves or how well he achieves is not the focus of the interview. Impress upon the student that the stimulated recall interview is not a memory test nor a test of any kind. He/she should consider the (taped) lesson as an ordinary lesson and behave or react as he naturally would.

Prior to the Interviews with the Student or the Teacher:

1. Preview the videotape of the lesson to identify those segments which appear most significant for investigating the thought processes of the student or teacher.
2. Arrange the interview setting so that the interviewee can look directly at the monitor and not be distracted by the interviewer.
3. Give the student or teacher time to become familiar with the operation of the VTR, have the student or teacher operate the VTR and spend some time in viewing the videotape, particularly if the student or teacher has never viewed himself on videotape before.

4. Explain the purpose of the stimulated recall interview and indicate clearly what is required of the student or teacher. Stress that the role of the student or teacher is to recall the thoughts, feelings, and moment-to-moment reactions experienced during the lesson and to indicate when a conscious decision was made and the reasons for making that decision.

5. Explain to the student or teacher that he/she will probably form new impressions of the lesson and of the events which occurred during the lesson while viewing the tape. Ask the student or teacher to try and distinguish during the interview between the thoughts and feelings experienced during the lesson and those experienced after the lesson or when watching the videotape.

Discuss with the Teacher the Goals of the Research

At the present time very little is known about the thought processes of those involved in the classroom teaching-learning situation. These processes are the focus of interest of this research project. The goal of this research is to find out what information the teacher and the students use during instruction and how they process this information. The interactions between the teacher and the students are of special interest.

It is considered that a study of these processes could yield insights which would assist in the development of theories of teaching and learning and which would lead eventually to the improvement of teacher education programs and school curricula. How well the lesson was taught and how well the student learned is NOT the focus of the interview.

Role of the Teacher/Interviewee

The method used in this research project to obtain data on teachers' information processing during instruction is called "stimulated recall." Asking teachers to recall after a lesson the thoughts and feelings they experienced while actually teaching the lesson has not proved very satisfactory. Recall of thoughts and feelings is facilitated when teachers are shown a videotape of the lesson. Seeing events in the lesson on videotape helps to trigger or stimulate recall--hence the term "stimulated recall."

Whereas it is possible to have people in some professions "think out loud" about their professional duties because they are not interacting with other people, it is not possible to do this with teachers because it would interfere with the instructional process.

We know that the mind works faster than the voice. As teachers interact with children in the classroom they--

- become aware of many more classroom events than can be inferred from their verbal and nonverbal behavior;
- react to classroom events emotionally and intellectually in ways which even the most perceptive observer could not detect because they are internal--many reactions are not revealed to the observer;
- make numerous decisions about what to do and say next or at some future point in the lesson, or what not to do or say. The alternative courses of action considered, the reasons for the final choice of action are frequently not declared or revealed; the observer is not privileged with this "inside" knowledge and with the various rationales.

As the teacher relives the lesson by viewing the videotape, he is invited to provide a detailed account, to talk aloud, about:

(a) thoughts, feelings, moment-to-moment reactions;

(b) conscious choices (that is, when you chose to do or say one thing rather than other things, or when you chose to say or do nothing), the alternatives you considered before making a choice, and the reasons for choosing to do or say that particular thing.

Note:

1. You may stop and start the tape as often as you wish.
2. The interviewer may also stop the tape on some occasions to ask you if you can recall your thoughts, feelings, reactions, etc., in relation to certain classroom events.
3. The interviewer's role is simply to assist you to recall what you thought and felt during the lesson.
4. As you view the tape you will probably form new impressions of the lesson and of events which occurred during the lesson, and think of other things that you might have said or done. Try to distinguish during the interview between the thoughts and feelings you had during the lesson and those you had after the lesson or when watching the videotape; ensure that the interviewer is aware of the distinctions too.

If you have any questions, the interviewer will be pleased to discuss these with you prior to the interview.

Role of the Interviewer

In the stimulated recall session with the student or teacher, the role of the interviewer is to assist the student or teacher to recall and verbalize the covert thoughts and feelings experienced during the lesson which has been videotaped. To facilitate as complete and as accurate recall as is possible the interviewer must:

- try to establish a relaxed, friendly, supportive atmosphere prior to and during the interview;
- try to facilitate and encourage self-discovery; it is important for the interviewee to believe that he/she is capable of telling about inner processes without the interviewer telling the interviewee what they were;
- avoid making interpretations of, and judgments about, what appears on videotape; ask questions requiring elaboration or clarification but avoid questions answerable by "yes" or "no";
- assume a respectful set towards the student or teacher and the videotaped material; communicate to the interviewee that he/she is being taken very seriously;
- keep the student's or teacher's attention focused on the TV image; refrain from unnecessary activity as such activity may actually interfere with recall;
- encourage the interviewee to talk; don't have the student or teacher become so engrossed in listening to you that the person forgets what he/she is reliving; the interviewee is the authority--you are that person's interested student;
- be patient; give the interviewee a chance to become involved in reliving the recorded lesson;
- immerse yourself in the interviewee's communication rather than trying to figure out what to say next;
- keep the student's or teacher's discussion focused on what transpired in the actual videotaped lesson and, in particular, on the student's or teacher's covert thoughts, feelings, and the sources of these; conscious decisions and reasons for making those decisions;
- stop the tape (if the student or teacher has not already done so) at points in the lesson where it appears likely to be profitable for purposes of this research and at the following points identified during a preview of the videotape:
    1. When the teacher asks a question of the student (or another student).

2. When the student's (or another student's) answer to a question is part-correct or incorrect.
3. When a student-initiated question (relevant) occurs.
4. When a student-initiated comment (relevant) occurs.
5. When the teacher responds to a student's answer.
6. When there is a behavior-related teacher-afforded warning.
7. When there are non-verbal cues suggesting that the teacher (or student) is anxious, annoyed, perplexed, excited, enthusiastic, excited, etc.
8. When the lesson is not running smoothly.
9. When the student interacts with other students.

- ask probing questions to facilitate maximum disclosure by the student or teacher, for example:

  What were you thinking, feeling at that point?
  Why did you say, do ......?
  Did you have any reasons for saying, doing ......?
  Did you understand what the teacher was saying, doing ......?
  What did you think the teacher was wanting, thinking, ...?
  Can you recall any other kinds of thoughts you had?
  Were there any fantasies (daydreams) going through your mind?
  Was there anything that you did not want to happen?
  Was there anything that you wanted to do at that time?

  Note: Questions should be brief and should create an intense awareness in the student or teacher of himself/herself. Avoid questions which are suggestive of, or imply criticism, incredulity, disagreement, disapproval, etc.

- check frequently that the student or teacher is differentiating between interactive thoughts and feelings and those subsequently formed.

APPENDIX C

PRE-TEST AND POST-TEST INTERVIEW SCHEDULES

PRE-TEST AND POST-TEST INTERVIEW SCHEDULES

Pre-Test Interview Schedule

1. What is coming up tomorrow? ... (the test)
2. How do you expect to get on?
3. Why do you think you will do __________?
4. What is there about the unit that makes you think you will do __________?
5. How do you expect to feel? Why?
6. Do you ever think of how others might be doing in the test?
7. How do you know how well they are doing?
8. Do you think they wonder about how well you are doing?
9. Do you think the teacher will know how well you are doing?
10. What do you think she will think of you and motion geometry after the test?
11. Why do you think she will think this of you?
12. Do you care much about how well you do on the test? Why?

Post-Test Interview Schedule

1. How did you get on in the test?
2. Were you surprised at the result? Why?
   Why not?
3. Why do you think you got __________?
   OR
   What reasons would you give for getting __________?
4. How do you feel about this result?
5. Do you have any idea of how others got on?
6. How do you know how they got on?
7. How do you feel about them knowing your result?
8. What do you think the teacher thinks of you after this test?
9. Will the teacher be surprised about you and the math test?
10. You have a pretty good idea of how well you are doing in maths. Do you think the teacher has the same idea about you and maths as you do, or are her ideas different?

APPENDIX D

SUMMARY OF CATEGORIES IN THE REVISION OF THE EXPANDED BROPHY-GOOD TEACHER-PUPIL DYADIC INTERACTION CLASSROOM OBSERVATION SYSTEM

SUMMARY OF CATEGORIES IN THE REVISION OF THE EXPANDED BROPHY-GOOD TEACHER-PUPIL DYADIC INTERACTION CLASSROOM OBSERVATION SYSTEM

The summary of categories in the low inference observation system is adapted from Marland (1977). The main differences from the system used by Marland pertain to the private dyadic teacher-student contacts.

The major aspects of classroom life coded by this system are represented by the four cells in the diagram appearing below. Within each cell are the sub-categories of those four aspects which are then further broken down into still smaller units.

	Public Response Opportunities	Private Dyadic Teacher-Pupil Contacts
Teacher Afforded	A.	C. I. Work-related II. Personal III. Procedure-related IV. Behavior-related
Student Initiated	B. I. Student initiated questions II. Student initiated comments	D. I. Work-related II. Personal-related

A. Teacher Afforded Response Opportunities

The three key aspects of this category of classroom event are:

(a) they are public interactions between the teacher and a child, intended to be monitored by the class or group with which the teacher is working;

(b) they occur when the teacher asks a question requiring either a verbal or nonverbal response;

(c) only one child makes the response.

For each response opportunity that is coded, information has to be checked off in each of four subcategories: (1) type of response opportunity; (2) level of question asked; (3) quality of child's answer; (4) nature of the teacher's feedback reaction.

(1) Types of response opportunity

Predesignated (PRE):	teacher names the child first and then asks a question;
Non volunteer (N. VOL):	teacher asks a question first but calls for a response from a child who has not raised his hand;
Volunteer (VOL):	teacher asks a question first and invites a response from a child with hand raised;
Called out (CALL):	teacher asks a question but a child calls out the answer before the teacher has a chance to select a respondent; the teacher nevertheless responds to the child who called out the answer.

(2) Level of question asked

Process (PCSS):	question requiring student to integrate facts or show knowledge of their relationships;
Product (PROD):	question for which a specific correct answer is sought;
Choice (CHOIS):	question requiring an answer to be selected from one of the alternatives presented;
Self Reference (SELF REF):	question requiring child to make a non-academic contribution to the classroom discussion. This type of question has then to be further classified as subject-matter related (SUB) or non subject-matter related (NON SUB) and then whether it requires the child to show a preference (PREF) or to give information about his past experience (EXP).
Opinion:	question requiring student to take a position on an issue or to predict the outcome of an experiment or hypothetical situation. If the child gives no response (NR) this is coded. On the other hand if the child does respond, the teacher's reaction to

the answer is coded: if it is praised (‡), criticized (=), ignored (0), accepted (ACPT), integrated (INTEG) into the ongoing discussion, or if the teacher disagrees (DISAG) with the child's opinion.

(3) Quality of child's answer

The child's answer is coded as correct (+), partially correct (±), incorrect (-), or no response (NR) but, if the child indicates that he doesn't know, this item of information is also coded (DK).

(4) Nature of the teacher's feedback response

The teacher's reaction to the child's response has been categorized as terminal or sustaining. Reaction which is terminal, that is, it has the effect of terminating the interaction with the child, could be one of nine types. The teacher may praise (‡), criticize (=), ignore (0), give a simple affirmation (AFFIRM) or simple negation (NEGATE), give process feedback (PCSS), give the correct answer (GIV ANS), ask another (ASK OTH) child for the answer, or the answer may be called out (CALL) by another student. Reaction which is sustaining, that is, it has the effect of prolonging the interaction, could be one of four kinds. The teacher may repeat the question (REPT Q), rephrase the question or give a clue (REP or CLU), ask a new question (NEW Q), or repeat the student's statement (REP SS).

B. Student Initiated Response Opportunities

I. Student initiated questions

This category of response opportunity is used if the student asks the teacher a question regarding the subject matter under discussion or some other matter. If the student calls out (CALL) the question without prior teacher approval, this point is coded and also if the question is relevant (REL) or irrelevant (IRREL). Two kinds of teacher reaction to the question, praise (‡) and criticism (=), are coded if they occur, and also types of teacher feedback. The teacher may provide no feedback (0) (that is, ignore the question), delay (DELAY) her answer, not accept (NACPT) it into the discussion, provide a brief or long answer or she may redirect (RDRCT) the question to another student. Three other categories, praise (‡), criticism (=), and warning (WARN), are provided if the teacher makes a reaction related to the student's behavior in initiating the question.

II. Student initiated comments

The details surrounding a student initiated comment that are coded are very similar to those for a student initiated question. All but three teacher response categories, brief, long, and redirect (RDRCT) are retained. They are replaced by another three. The teacher may accept (ACPT) the student comment, integrate (INTEG) it into the class discussion, or may use it to shift the direction of the class discussion.

C. Teacher Afforded Dyadic Contacts

I. Teacher afforded contacts (work-related)

These are instances when the teacher makes private contact with an individual child about his work. Several features of these contacts are coded. The duration of the contact is timed. The contact may be one in which the teacher just observes (OBSERV) without entering into verbal interaction. The teacher may praise (+), criticize (-), ignore (0), give a simple affirmation (AFFIRM) or a simple negation (NEGATE), give process feedback (PCSS), or give the correct answer (GIV ANS). Alternatively the teacher may sustain the interaction. He may repeat the question (REPTQ), rephrase the question or give a clue (REP or CLU), ask a new question (NEW Q), or repeat the student's statement (REP SS).

II. Teacher afforded contacts (personal)

These contacts do not involve either work content or procedure but are of a strictly personal nature.

III. Teacher afforded contacts (procedure-related)

Within this category a distinction is made between those instances when a teacher seeks a favor (child helps in running the classroom) and those in which the request has to do with getting the child ready to work. The latter are coded as management (MANAG). Thank you (THANKS) is coded if the teacher thanks the child following the management or favor request.

IV. Teacher afforded contacts (behavior-related)

This category is used whenever the teacher makes some comment on the child's classroom behavior. They are subdivided into praise (+), non-verbal intervention (NVI), warnings (WARN), and criticism (-). Errors which the teacher makes when warning a child are also noted. Three kinds of errors, target errors (TARG), timing errors (TIM), and overreactions (OVERT) are coded. The no error category is used whenever the teacher does not make one of the three errors. Provision also exists for the coder to record his *uncertainty* (?) if he is not sure that an error has occurred.

D. *Student Initiated Dyadic Teacher-Pupil Contacts*

(referred to as Child Created Contacts on the coding sheets)

I. *Child created contacts* (work-related)

This type of contact may be initiated by a *content comment* (CONT C), a *content question* (CONT Q), a *procedural comment* (PROC C), or a *procedural question* (PROC Q). The teacher's feedback to the child is coded as either terminal or sustaining. The teacher may *praise* (‡), *criticize* (=), *ignore* (0), give a simple *affirmation* (AFFIRM) or a simple *negation* (NEGATE), give *process feedback* (PCSS), or *give the correct answer* (GIV ANS). Alternatively, the teacher may sustain the interaction. He may give *process feedback* (PCSS), *give a clue* (GIV CLU), ask a *new question* (NEW Q), or *repeat the student's statement* (REP SS). Where sustaining feedback in the form of a question is provided by the teacher, the student may give a *correct* response (+), a *partially correct* response (±), or an *incorrect* response (-). For other teacher sustaining feedback the student may *ask a further question* (ASK Q), make an appropriate *comment* (COMMENT), or simply *acknowledge* the teacher reaction (ACKNOW).

II. *Child created contacts (personal-related)*

In this category there are two first-order divisions, *experience* (EXP) sharing and *procedural* (PROC). All experience sharing contacts are personal ones in which the student contacts the teacher to tell him something which is not related to either classroom work or procedure. The teacher's response is coded as either *acknowledged* (ACK) (that is, the contact is acknowledged by the teacher) or *delay* (that is, the teacher indicates she is unable to listen or talk to the pupil at that time).

A procedural contact occurs when the pupil is making a request, offers to do an errand, or reminds the teacher of something. The teacher's reaction is coded as *grant* or *non-grant* (N GRANT) (teacher has or has not granted the request) or as *delay*.

APPENDIX E

POST-OBSERVATION OPEN-ENDED STATEMENT COMPLETED BY THE TEACHER

POST-OBSERVATION OPEN-ENDED STATEMENT COMPLETED BY THE TEACHER : A VERIFICATION OF VALIDITY

Following the observation phase, the researcher requested the teacher to write down everything she knew about or perceived regarding the intention and direction of the research. She was invited to classify her thoughts into (a) definite knowledge, (b) strong additional hunches, and (c) possibilities (no matter how slight the bases for thinking these). The following is the teacher's statement of her thoughts.

> As requested in your letter of November 21, I submit the following as my knowledge or perception of your research project:
>
> The project proposed to look at the thought processes and observable behaviour of the teacher and students during regular mathematics lessons. Lessons would be video-taped over a two-week period, then used to stimulate recall of thoughts during an interview. The information that was obtained from video-taping and interviews would later be coded and classified and analyzed; hopefully this would lead the researcher to some clues concerning thought processes during teaching and learning and how these thoughts influence us to do or think certain things. The use of stimulated recall had already been researched and proven viable in this type of study.
>
> The study involved a two-week period of familiarization. During this time, the researcher made use of classroom observation, personal interviews, casual conversation and inventories to acquaint himself with the participants. To ensure that the video-taping would take place in as normal a setting as possible and that participants would act as naturally as possible, the video-equipment was utilized during this time, followed up with individual interviews. In short, "trial-runs" of the daily procedures of the next two weeks were carried out.
>
> During the two weeks of actual taping, the researcher recorded math. lessons, usually in their entirety, meanwhile logging key points and interactions with the video meter. Outside the classroom, the researcher previewed the lesson, selecting suitable segments that would be used later to stimulate thought-recall. A variety of individual and small group interviews were conducted and recorded. Later the researcher would review the interviews, transcribing, coding and analyzing the data.
>
> Signed: Teacher
>
> November 23rd, 1978.

APPENDIX F

SAMPLE OF LESSON OVERVIEW

SAMPLE OF LESSON OVERVIEW : LESSON 4

Time	VTR Counter	Indicators, Interactions, Questions
10:08	000	Tr: We will have some practice making some flip images.
		Students move to get tracing paper
	010	
	016	Tr: Students given warning to hurry
	020	
	021	Tr: Please wait and we'll do these together
	025	Tr contact with Roger
10:10	030	Tr: Let's review as to how we use the Plexiglas.
	040	Tr: Holding it straight up and down
10:11	049	Tr: Can you with your finger trace along the ...
10:12	059	Tr: Try and find the very most top point of the leaf.
	060	
	067	Trevor: Student question.
	070	
	072	Tina: Student question.
		Arthur.
10:13½	077	Tr to Trevor
	080	
	083	Rodney to teacher
		Tr with Cathy
		Tr with Cheryl
	087	Lisa out of desk
	090	
10:15	092	New instructions to Rodney
	097	Tr to Cheryl
	100	Rodney up with Trevor--also interacting with Tina
	107	↳ Tr to Denis
	110	Lisa call out, Tr accepts.
		Tr gives extra instructions to those finished.
	117	Richard to tr.
		Tr to Cheryl
	120	Greg to tr, "Look what I've got. It looks horrible!"
10:17	125	↳ Tr to Denis
		Tr to the BB--explaining re sending a message using the Plexiglas.
	130	
	135	Thelma to teacher--she had gone on ahead.
		Ricky to teacher.

Time	VTR Counter	Indicators, Interactions, Questions
	140	Andrew to teacher
	141	Thelma given another worksheet.
	144	Tr with Lisa
	150	
	156	↳
10:20	160	Tr: Okay, let's try the next example with tracing paper.
	163	Tr to Cathy.
	168	Denis: Student question, "Which one are we doing?"
	170	
	178	Tr: How are we going to check congruency?
	180	Sandra responds.
	188	Tr: Now you are ready to flip your image.
	190	
	192	Denis: Student question.
	195	Tr used Denis' comment. .... Rodney out of desk.
	200	Tr to Roger
	203	Tr to Denis
		Tr to Thelma
	207	Tr to Lisa
	210	
	212	Trevor out of desk to Tina
	214	↳
10:23½	215	Tr to Ria.
	217	Tr: Which did you prefer, the tracing paper or the Plexiglas.
	220	
	223	Tr: Let us do some checking with the Plexiglas.
	225	Trevor and Tina still interacting.
	230	
10:25	233	Lisa call out.
		Thelma to the teacher.
	238	Tr: All right. Go ahead and use whichever method you prefer.
	240	
	249	Denis: Calls for tr's attention across the room.
	250	
	253	Tr to Richard.
	260	↳
10:27	261	Tr to Rodney
	270	Tina out of desk for tracing paper.
	277	↳
	280	Tr to Richard. Mike waiting by tr.
10:29	293	Mike talks with teacher.

APPENDIX G

CONTENT ANALYSIS OF STUDENTS' INTERACTIVE THOUGHTS (CASSIT)

CONTENT ANALYSIS OF STUDENTS' INTERACTIVE THOUGHTS (CASSIT)

This content analysis system has been developed to enable the categorization of students' interactive thoughts and feelings during the learning of mathematics. The structure and format of the system, and its underlying rationale, reflect the direct influence of Conners' (1978a) and Marland's (1977) systems for analyzing teachers' interactive thoughts. However, the categories of the system have been generated from examination of the transcripts of the students' interviews and, in part, from a consideration of the major research questions of the study.

Researchers have long recognized the probable interdependence of students' task-oriented and self-oriented thoughts and feelings while learning. An analysis of this covert behavior could suggest bases for, and provide cues to, a better understanding and appreciation of student learning in the normal classroom.

Data

Transcripts of students' interactive thoughts during a lesson contained the data to be analyzed. The transcripts were prepared from audio recordings of post-lesson interviews with each of the students. The post-lesson interviews involved largely the use of stimulated recall methodology. While viewing a video recording of a recently completed lesson, each student was asked to report his thoughts and feelings during the lesson. The verbalized recall of thoughts occurred at each of a number of stimulus points in the lesson chosen by either the interviewer or the student. Normally, on each occasion, the videotape was stopped. Following the student's reporting of thoughts and feelings during a particular stimulus point in the lesson, the interviewer often questioned the student further regarding some of the causal explanations and perceptions of his overt and covert behavior.

The data available in the transcripts, therefore, consists of more than just students' interactive thoughts. Data of a non-interactive form include:

1. Subsequent disclosures pertaining to causal explanations and perceptions of a student's behavior.

2. References by the student to thoughts or feelings experienced prior to the lesson (preactive data).

3. Thoughts and feelings which a student had after the lesson or during the post-lesson interview (postactive data).

4. Discourse during which the student endeavoured to explain an incident, situation, or circumstance for the benefit of the interviewer.

Coding

There are two major steps in the content analysis system:

1. Identification of interactive data.
2. Unitization. This second phase of the system usually involves two stages:
   (a) identification of units of interactive data, and
   (b) placement of units of interactive data into categories.

Step 1 : Identification of Interactive Data

The first step in using the content analysis system is to identify those thoughts and feelings that the students report as having occurred during the lesson. These thoughts and feelings are the interactive data and are to be distinguished from the non-interactive data, that is, those thoughts and feelings that occurred before or after the lesson. Non-interactive data is not to be coded.

Before each interview the student was reminded that the interviewer was seeking recall of only the thoughts and feelings which occurred during the lesson. In addition, the student was asked to indicate when non-interactive thoughts were being verbalized. While the student was able to contribute in this way in some cases, the differentiation between interactive and non-interactive data remains largely the task of the coder.

However, in the transcripts, many clues make easy the task of distinguishing interactive from non-interactive data. Examples of clues which indicate interactive data are:

S: I was just thinking about . . . .

S: I was sort of feeling . . . .

I: What were you thinking then?
S: I was kind of laughing at him in my mind. He looked so funny . . . .

I: When you first saw the worksheets what were your thoughts at that time?
S: I'd probably get through it in short time. It usually is quite easy.

Likewise, many clues in the transcripts indicate non-interactive data:

S: I can't remember going like that . . . .

S: I think I was thinking a bit about Richard . . . .

S: . . . and I was kind of upset last night because I thought . . . .

I: You were saying?
S: Me and Ruth have a habit of putting our pencils in our mouths.

Guidelines. In addition to the obvious clues for distinguishing between interactive and non-interactive data, there is available a set of appropriate guidelines developed by Marland (1977). The guidelines specified below are modified slightly from Marland's set. They should be used especially when the clues illustrated above are less clear or not present. In the examples of non-interactive data provided with each guideline, any included interactive data have been underlined.

Guideline 1

Label as non-interactive those sections of the transcripts in which the student is recalling what he was saying or doing, or what he had said or done, rather than what he was thinking.

Example:

S: . . . so I looked in my notes, my book to see what it looked like.

Note 1: Statements indicating that the student saw, heard, or sensed what another student or the teacher was saying or doing are to be coded as interactive since it is clear that the student was processing other people's behavior during that segment of the lesson.

Examples:

I: Can you remember what you were thinking at that time?
S: About the fight. I was looking at what they were doing.

S: I was just finishing the first part when I heard her say, "Example B."

Note 2: When the student is describing or referring to a learning experience and his description contains reasons, purposes or consequences, then the data are to be coded as interactive.

Example:

S: Well...like just before I went up, and we were all talking like, because we were talking about the picture like, we couldn't get it exact. So he went up first to ask so that I decided that I might as well go up to find out.

Guideline 2

Label as non-interactive those sections of the transcripts in which the student is showing awareness of what he was doing rather than of what he was thinking.

Example:

S: I can't remember. But I remember me shaking my head, 'cause I saw her looking at me.

Guideline 3

Label as non-interactive those sections of the transcripts in which the student is engaged in general discussion about learning, and situations in the learning process that sometimes arose, where it is obvious that the discussion is not related to the interactive thoughts of the student.

Example:

S: You know, I know symmetry, and she...I would just ask what the question was again and she would tell me and then I would know.

Guideline 4

Label as non-interactive those sections of the transcripts in which it appears the student is providing a reason, explanation, or rationale for what he was doing or saying.

Example:

S: I don't like eating, but sometimes things are so boring that I feel like doing something, so I eat. Sometimes I draw, but that draws my attention from the board and then I might miss something.

Guideline 5

Label as non-interactive those sections of the transcripts in which the student summarizes, restates, reviews what he or the interviewer said previously.

Example:

S: I got it wrong a couple of times and went to another picture.
I: Yes. So you...
S: Went onto an easier question and just left the hard one.

Guideline 6

Label as non-interactive those sections of the transcripts in which the student discloses causal explanations and perceptions of behavior in response to extended questioning by the interviewer. These disclosures tend to consist of personal justifications, rationalizations, motives, or emotions that underlie student interactive thoughts during learning. At the time of a lesson these processes would probably function in a subconscious or reflexive manner, given the speed and complexity of most covert behavior.

Example:

I: What do you do with the questions that are hard?
S: Well, I try to figure them out, or go up to the teacher or raise my hand.
I: How do you feel when you have to go up and see the teacher?
S: Well, I like to wait when there is hardly anyone there. So that I'll feel better.
I: Why does it make you feel better?
S: Well, kids...I'm kind of shy a bit still.
I: And you were going to say about the kids?
S: Well, like they might laugh at the question I have to ask for.

Guideline 7

Label as non-interactive those sections of the transcripts where the student indicates any uncertainty about thoughts and feelings being interactive.

Examples:

S: Well, I think I was kind of . . . .

S: I guess I was thinking . . . .

Guideline 8

When classifying parts of the transcripts as interactive or non-interactive, look for contextual clues. Often decisions about the nature of sections of the data can only be reached after examining clues found in lines prior, or subsequent, to the section under scrutiny.

Guideline 9

When in doubt, classify the section of the transcript in question as non-interactive.

Step 2 : Unitization

According to Marland (1977), the unitization phase of a coding system usually involves two stages, namely, the process of unitization or segmentation and the process of categorization. Segmentation consists of dividing the data source into units, such as a paragraph, sentence, or thought. Categorization involves placing each unit into one of several discrete, clearly defined categories.

As Marland (1977:304) points out, "the distinction between the two stages of segmentation and categorization is [often] blurred because the unit selected is best understood in terms of the categories. In fact, the categories largely establish the unit." Therefore, in coding the data of this study, the procedure to be used involves one of examining the transcripts and determining each unit on the basis of a section of the data complying with one of the categories of interactive thoughts. The unit is only established when a segment of the transcript matches with the characteristics of a category.

The Unit. The unit of analysis in the content analysis system is what Marland (1977) and Conners (1978a) refer to as a thought or ideational unit. Conners (1978a:352) defines this unit as "a remark or series of remarks, which expresses a more or less complete idea, and serves a specified function." Consequently, the thought unit may comprise a single work, a part of a sentence, or an entire paragraph, so long as it is centered on a single thought.

Each single thought unit is to be clearly delineated when coding the interactive data by enclosing in parentheses.

Example of segmentation of student thoughts:

I: What were you thinking at that time?
S: (It's a crazy looking diagram) and (Crystal was trying to say that you could) [make a slide between two diagrams]. (There was no way you could.) (Just by looking at it you could tell.) (And she had to try it out,) (and I knew). ("Oh Crystal, you're nuts! There is no way you could make anything out of that like a slide.") (And I felt like going up there and changing it.)

Conners (1978a:353) refers to "false starts" and "mazes" as two common speech characteristics. However, because they do not meet the criteria of a single thought unit as defined, they are not to be unitized.

Examples of "false starts": (Examples are underlined)

S: Well...I was only...(I was trying it out in my mind.)

S: Well, I was going to, like say that, I didn't have, Plexiglas you know...(since it's quite thick and sometimes you have to move it around.)

Example of "mazes": (Examples are underlined)

S: (I was afraid I'd get laughed at if I got it wrong.) Like, because, when they, if I really want, because I wasn't sure, I didn't put up my hand.

Categories. From examination of the transcripts, nine categories of students' interactive thoughts and feelings have been created. Each category consists of a set of thought units with one or more distinct characteristics. Consequently, a thought unit may be categorized only once, given the discrete nature of the categories. The nine categories of interactive thoughts and feelings are: 1) subject matter, 2) cognitive processes, 3) behavioral moves--self, 4) behavioral moves--student, 5) behavioral moves--teacher, 6) self-performance--thoughts, 7) self-performance--feelings, 8) feelings, and 9) non-task-related.

Given the purpose of this study the categories of behavioral moves--self, behavioral moves--student, behavioral moves--teacher, self-performance--thoughts, self-performance--feelings, and feelings were subcategorized.

1. Subject Matter

Units in which a student's thoughts are focused specifically on the content and skills of mathematics are to be coded as "subject matter." Thoughts expressing ideas associated with the concepts, operations and applications of mathematics are typical of this category.

Example: (Shown in parentheses)

S: See, she asked if they were alike, (and just like they are all the same in size and that's it, they are congruent.)

When a student reports simply that he was thinking about math, the math question, or makes other general references to the subject area, then the units are not normally coded as subject matter. Such references usually occur in the context of being on-task, that is, attending, and are to be coded as "behavioral moves--self."

Care must be taken to exclude from the subject matter category any reference by the student to his thought processes involved when learning the mathematical concepts, operations, and skills. These are coded as "cognitive processes." Similarly, units of student perceptions of task structure and of task difficulty are not to be coded in this category, but rather as a subcategory of "self-performance--thoughts."

2. Cognitive Processes

A "cognitive process" is the unit in which the student reports a thought process involved in learning the subject matter. The thought process must include a mental action performed by the student as he engages in the task of learning. As covert behavior, these mental actions may be accompanied by overt behaviors, such as verbalizing, writing, and acting. Specifically, cognitive processes range from perceiving or being aware, to knowing or remembering, to understanding, to reasoning or justifying.

References to thinking how to do a task (a question, a problem, a worksheet) are included in this category.

Examples: (Shown in parentheses)

S: I remember that (I was thinking, I was doing on a piece of paper how it could be different.)

S: (I was trying to think how to do it.)

3. Behavioral Moves--Self

A "behavioral move--self" is a category in which the student reports his thoughts about an action he was performing, had performed, or was considering performing in relation to the learning process. Such an action must reflect a personality orientation, usually in the form of personal decisionmaking. Thought units should refer to actions involving a motive, desire, intention, interest, or some other self component.

A pair of subcategories of behavioral moves--self includes those references to avoiding or seeking public participation.

Example: (Shown in parentheses)

S: See I put up my hand...(I wanted to do the question.)

A further pair of subcategories refer to attending-listening and not attending-listening.

Examples: (Shown in parentheses)

S: (I was listening to what she was doing.)

I: What were your thoughts at that time?
S: Maths...(I was thinking about maths.)

A related pair of subcategories refer to the motives to attend and the motives to avoid attending. Some reference is also made to pretending to attend.

Example: (Shown in parentheses)

S: (I didn't want to listen to the maths lesson.)

4. Behavioral Moves--Student

A "behavioral move--student" is a category in which the student reports his thoughts and feelings about an action involving other students. The thought units may refer to either the other student as a person, the other student's behavior, or both.

Subcategories of behavioral moves--student include perceptions of other students' performances, inferences of other students' thoughts, perceptions of other students' behavior, and a direct interaction with another student or students.

Examples: (Shown in parentheses)

S: (I saw that he had got his all right.)

S: She was looking at me and (I could tell she was thinking she was stupid.)

S: (Jenny was working hard) so (I decided to ask her what was going on.)

Thought units in which a student reports a self-performance thought in relation to an involvement by a significant other student are excluded from this category, and are to be coded as "self-performance--thoughts."

5. Behavioral Moves--Teacher

A "behavioral move--teacher" is a unit in which the student reports his thoughts and feelings about an action involving the teacher. The thought unit may refer to either the teacher as a person, her behavior, or both.

Subcategories of such actions by the student include a sensory experience or a cognitive experience such as a perception, interpretation, or evaluation of the teacher's behavior, perception of the teacher's instructional moves, and a direct interaction with the teacher.

Examples: (Shown in parentheses)

S: (I wondered why she began to talk quietly to us.)

S: (I saw that she was asking all the kids without their hands up.)

Thought units in which a student reports a self-performance thought in relation to an involvement by a significant other teacher are excluded from this category, and are to be coded as "self-performance--thoughts."

6. Self-Performance--Thoughts

Units in which the student is thinking about his performance behavior and outcomes are to be coded as "self-performance--thoughts." The essential element of these work-related units is self, where the student is (i) reflecting upon how well he has achieved thus far, (ii) monitoring his work performance of the moment, and (iii) contemplating his expectancies of future behaviors and outcomes.

Some subcategories of self-performance thought units emphasize aspects of self-evaluation. This cluster of subcategories consists of references by the student to self-assessment of success, self-assessment of failure, perceptions of task difficulty, and perceptions of task structure. Perceptions of task structure are those units which reflect how a student views the task before him. Does he believe success or failure on the task will depend on his own level of competence and input of effort (for example, "I could see how to do it") or does the student believe that success or failure on the task is controlled by factors external to the self (for example, "I couldn't see how to do it")? Elements of personal judgement of competence are contained in a task structure perception.

Examples: (Shown in parentheses)

S: (I thought I would get it all right.)

S: (I knew I didn't do too well and I got three wrong.)

S: (The worksheet was pretty easy.)

Thoughts which are causal explanations of self-performance behaviors and outcomes are to be coded as the subcategory of self-attributions. Likewise, thought units which are references to a student's future performance behavior and to his outcome expectancy of success or failure are to be coded as the subcategory of self-expectations.

Examples: (Shown in parentheses)

S: (I was trying) but I just couldn't get it.

S: (I don't usually get it right.)

Another subcategory of "self-performance--thoughts" units relates to the contributing effect of significant others on performance behavior and outcomes. The primary element of these thought units is self, that is, the mind of the student is focused upon his performance behavior or his performance outcome. The significant other element relates to this self by way of acting as a perceived probable consequence, a causal explanation, or a guideline for self-evaluation. These units of thoughts often relate closely to the appropriate cluster of units in the category of "self-performance--feelings."

Examples: (Shown in parentheses)

S: (If I got a lot wrong they would laugh at me.)

S: (I didn't want anyone to see it because I knew I was wrong as soon as I done it.)

7. Self-Performance--Feelings

Units in which the student reports an emotion pertaining to his performance behavior and outcomes are to be coded as "self-performance--feelings." As expressions of affective states in relation to self-performance, these units are to be coded as:

(a) anxiety, e.g., concern, worry, fear;
(b) morally neutral--positive, e.g., happiness;
(c) morally neutral--negative, e.g., unhappy, sad, disappointment;
(d) morally unneutral--positive, e.g., pride;
(e) morally unneutral--negative, e.g., shame, embarrassment, jealousy.

Examples: (Shown in parentheses)

S: I said, ("Oh, I'm gone completely.")

S: (I was really happy with my result.)

S: When I was wrong (I felt bad).

S: (I felt proud for now my Mom could brag about me.)

S: (I felt so stupid when I knew I was wrong.)

8. Feelings

The transcripts contain reports by students of the emotions they experienced during the lesson, other than those experienced in association with self-performance. These other emotions are expressed about many classroom happenings and usually take the form of pleasure, surprise, annoyance, frustration, apprehension, and anxiety.

Subcategories of (a) positive emotions and (b) negative emotions are to be used.

Examples: (Shown in parentheses)

S: (I was really excited.)

S: I didn't feel like listening (because it was getting boring.)

9. Non-Task-Related

Student thoughts which do not pertain to the learning of the subject matter are coded in this category. In general, the units reflect off-task thoughts such as investigator awareness, matters external to the classroom and the lesson, and self-involved and other student distractions.

Examples: (Shown in parentheses)

S: (I was watching the camera to make sure that you couldn't pick me up, and suddenly you got me.)

S: (I was thinking about the weekend, then Hallowe'en.)

Coding Guides

1. Using the guidelines provided, decide whether the data are interactive or non-interactive.

2. Place parentheses around each thought unit within the set of interactive data.

3. Assign each interactive thought unit to a category.
   Note: Coding guides No. 2 and No. 3 usually will occur concurrently.

4. Where repetitive interactive data are noted, unitize with the parentheses but do not categorize. Mark with asterisks so as not to include them when quantifying the thought units.

5. Where one unit appears within another unit, place brackets around the inner unit and categorize separately.

   Example:

   S: (I wanted to question him [because I didn't understand it] and I wanted to ask him to help me.)